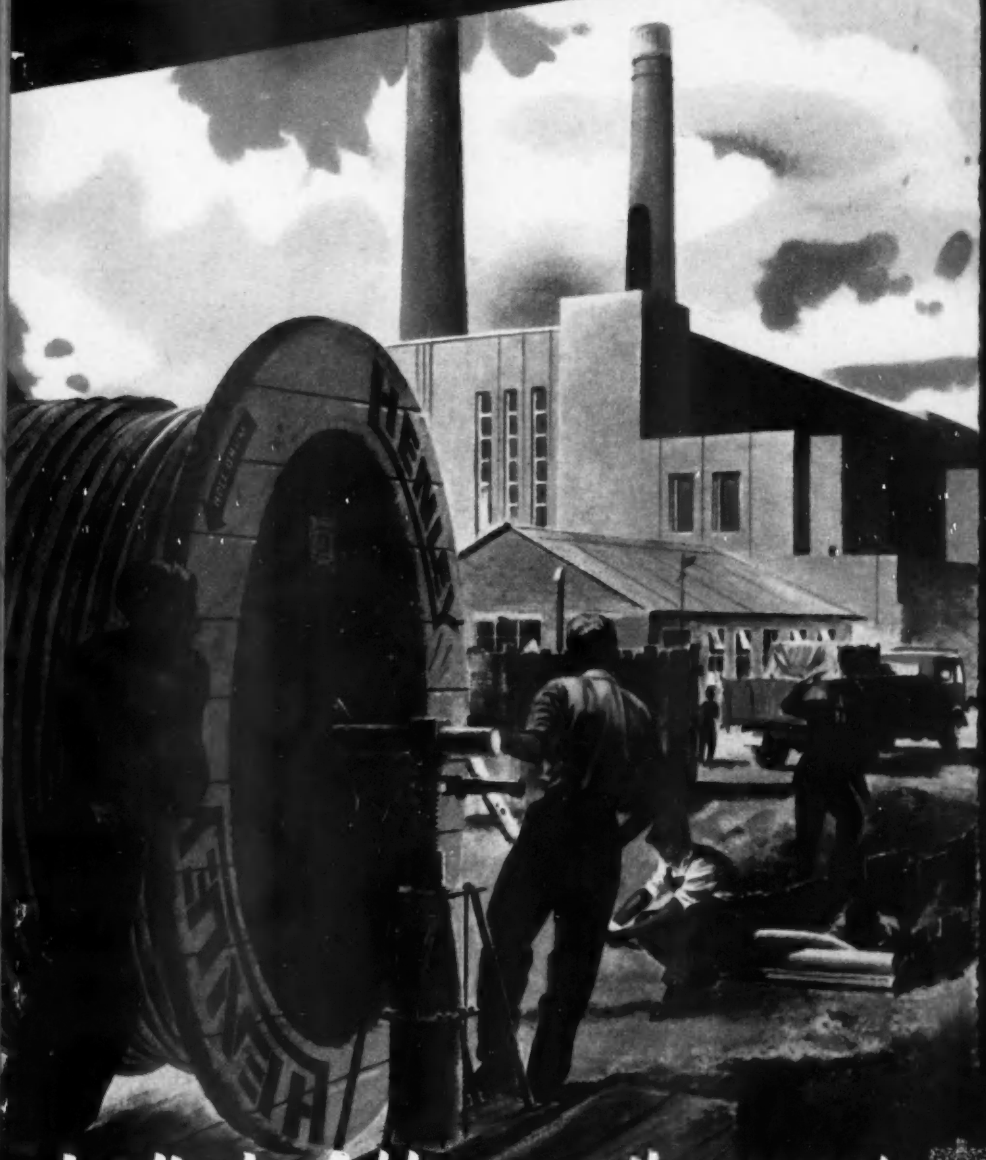
B.E.P. CONVENTION NUMBER

# ELECTRICAL TIMES

THURSDAY
11 JUNE
1953
NINEPENCE




Let Henley Cables carry the current

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD. 51-53 HATTON GARDEN, LONDON, E.C.1

# DUBILIER

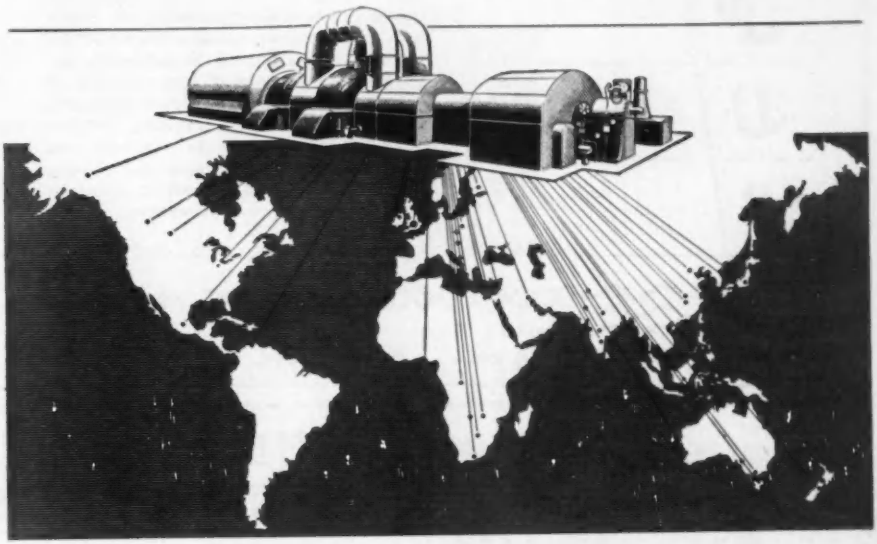
## *INTRODUCE*
## DUCONOL-THE LATEST DEVELOPMENT IN FLUORESCENT LAMP CAPACITORS !

The introduction of DUCONOL Capacitors constitutes the latest advance in the fluorescent lighting field. One of the most outstanding characteristics being smaller physical dimensions than the conventional type of capacitor. DUCONOL Fluorescent Lamp Capacitors are available in either round or oval seamless drawn aluminium containers with double seamed tops which, combined with the terminal design guarantee a completely hermetically sealed capacitor. The mechanical features and electrical characteristics ensure the capacitors will fully withstand the onerous conditions of use in fluorescent lighting installations and they will operate at ambient temperatures of 70°C. *Catalogue DU 553 giving details of the full range of Duconol Fluorescent Lighting Capacitors will be sent to you upon request.*

D87A

# 'ENGLISH ELECTRIC'

## steam turbo-alternator sets



## POWER GENERATION

The ENGLISH ELECTRIC Company has been designing and manufacturing steam turbo-generating plant of all types for Central Power Stations and industry for many years. This includes a wide range of machines with capacities up to 100,000 kW, hydrogen cooled, running at 3,000 r.p.m. and operating with steam conditions up to 1,500 p.s.i.g. and 1050° F.

During the years 1951 & 1952 The ENGLISH ELECTRIC Company supplied over 25% of all the new turbo-alternator sets commissioned in B.E.A. Power Stations.

In almost every country throughout the world 'ENGLISH ELECTRIC' steam generating plant and its associated transmission and distribution equipment is providing electric power for industry and the home.

**The ENGLISH ELECTRIC Company Limited**

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Steam Turbine Division, Rugby

*Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON*

STTA.6

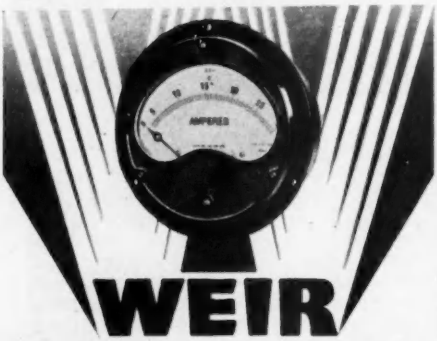

***See the English Electric advertisement for Domestic Appliances which appears on page 123.***

# COOLING WATER FOR INDUSTRY...

F — REPAIRS
C — NATURAL &
T — INDUCED DRAUGHT WATER COOLING PLANT

...this has been our speciality for more than a quarter of a century, during which time we have gained considerable experience in the design and erection of all types of industrial cooling equipment. Whether you are circulating 300 or 3,000,000 gallons of water per hour, we shall be pleased to advise you on the most efficient type of cooling plant to suit your requirements.

**FILM COOLING TOWERS (1925) LTD.**
LIONEL ROAD BRENTFORD MIDDLESEX
TELEPHONE · CHISWICK 2953 GRAMS · ALOOF, WESPHONE, LONDON



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## AMMETERS and VOLTMETERS

(Dial Sizes from 2" to 8")

Moving Iron, Moving Coil, Rectifier Types, Switchboard, Miniature, Controller, Portable

- Special instruments to customers' own requirements
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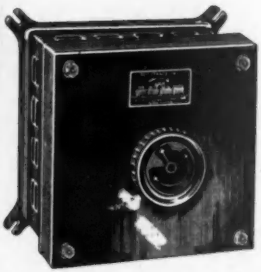
# SHUNT FIELD RHEOSTATS



For Motors, Generators and Alternators. Also as series Rheostats for voltage, heat and speed control. We shall be pleased to send full particulars and prices on request. And remember, the advice of Cressall Technicians is always available.

# CRESSALL

*Registered Trade Name of*

THE CRESSALL MANUFACTURING CO LTD
Tower Street, Birmingham 19
*Telephone:* ASTon Cross 2666 (3 lines)
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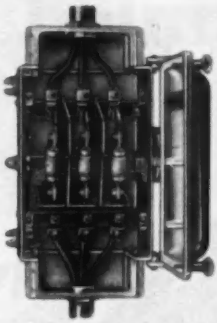
STAND Nº33 B.E.P.C. JUNE 8-12



IMPERIAL FUSE SWITCHES.

35 M.V.A. SHORT CIRCUIT "MAKING" TESTS

PREVIOUSLY TESTED AT 25 M.V.A..NOW SUCCESSFULLY TESTED AT 35 M.V.A. 440 VOLTS.

SIZES OF 30, 60, 100, 160, 200, 300 AND 500 AMPERES WERE TESTED AND ALL SWITCHES WERE FIT FOR NORMAL USE AFTER TESTS.

ENGLISH ELECTRIC CARTRIDGE FUSE LINKS WERE USED IN THESE FUSE SWITCHES.

FOR DETAILS OF IMPERIAL FUSE SWITCHES SEE PUBLICATION IM 153.

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
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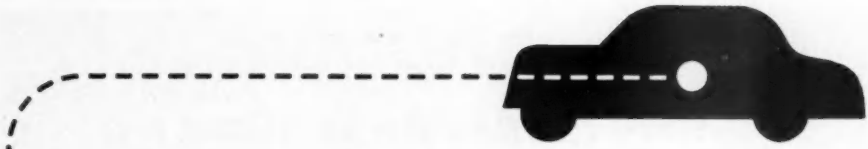


# Britannic Cables

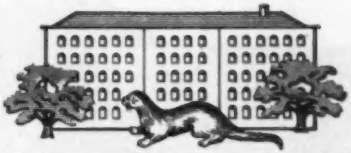
## carry the load

The starter's pressed, the engine fires . . . who thinks about the cabling in a modern car? No need when so often it's Britannic! In a thousand products of industry, where electricity plays a part, Britannic Cables "carry the load" faithfully, enduringly. Made by an independent company at prices which are truly competitive.

The Britannic range includes cables for power, industry, mining and domestic use. And the range is always extending.

BRITANNIC ELECTRIC CABLE & CONSTRUCTION CO LTD · IVER · BUCKS

*Busbar Trunking*



# OTTER MILL SWITCHGEAR

**THE OTTER MILL SWITCHGEAR range includes :**

Industrial Switchboards
Cat. SB.971

Oil Circuit Breakers 100 to 600 amps.
Cat. OCB.971 and OMS.971

Fused-Switches 60 to 400 amps.
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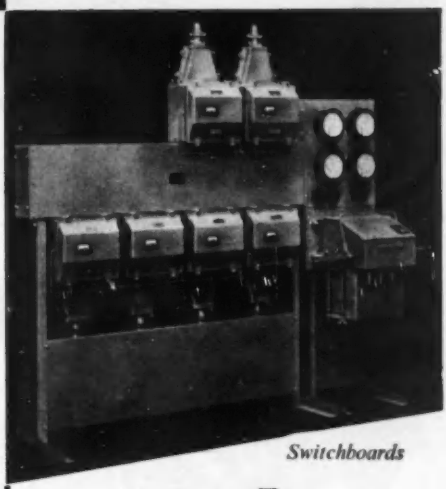
Busbar Trunking
Cat. BBT.102a and OMS.971

Moulded Fuse Units
Cat. SL.101 and OMS.971

*Write for illustrated catalogue quoting appropriate reference number.*



*Switchboards*

*Oil Circuit Breakers*

*Fused-Switches*

**G. M. ENGINEERING (OTTERY ST. MARY) LTD**
**Sales Office: 1 VICTORIA STREET, LONDON, S.W.1**
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**OVER 25,000 'THERMODARES' in use**

**24 HOURS HEATING— 8 HOURS CONSUMPTION**

Using 'OFF PEAK' cheap rate electricity THERMODARE HEATERS keep offices, showrooms, factories, schools, etc., at constant temperatures ALL DAY and NIGHT. Schemes prepared for the Trade.

**Prices from £11 7s. 7d. TAX FREE (Not for domestic installation).**

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**Telephone: ABBey 1060**

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NO doubt this was a common enough occurrence in the days of King Alfred, but today we have the D.S. COOKER CONTROL UNIT . . . compact, safe and efficient, incorporating the famous DS Fused Plug and Socket for the kettle and a 30A D.P. switch for the cooker

*Leaflet CC/1 tells you all about it*

DS Designed to Serve you well...
by D.S. PLUGS · MANCHESTER · 5

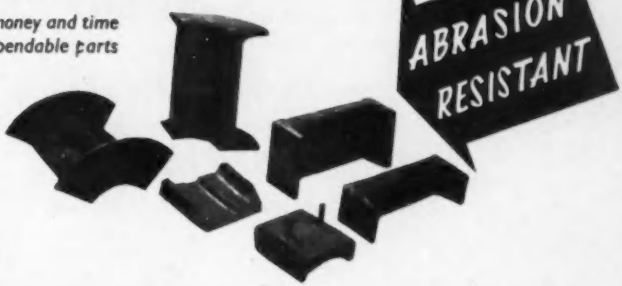
# Follsain-Wycliffe

## * Metals which save you money

* **CY** REG. D **WEAR RESISTING ALLOY**

*Saves you money and time on such expendable parts as follows:*

Grinding Mill Tables.
Exhauster Fan Liners.
Ash Troughs and Paddles.
Chute Liners.
Pyrites Scrapers.
CY solves your wear problems.




* "PENETRAL" REG. D.

**IMPREGNATION TREATMENT OF MILD STEEL**

Resists oxidation for temperatures up to 1000° C. and recommended for such applications as Superheater Tubes and Supports, 'U' Tubes, Soot Blower Elements.

* **EV HEAT RESISTING STEEL**

Specially valuable for Tube Supports and Clips, Furnace Arches, Baffle Plates, Recuperator Headers.

*Detailed literature available. Enquiries for all such specialised components invited*

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*Telephone: Lutterworth 10 & 60*

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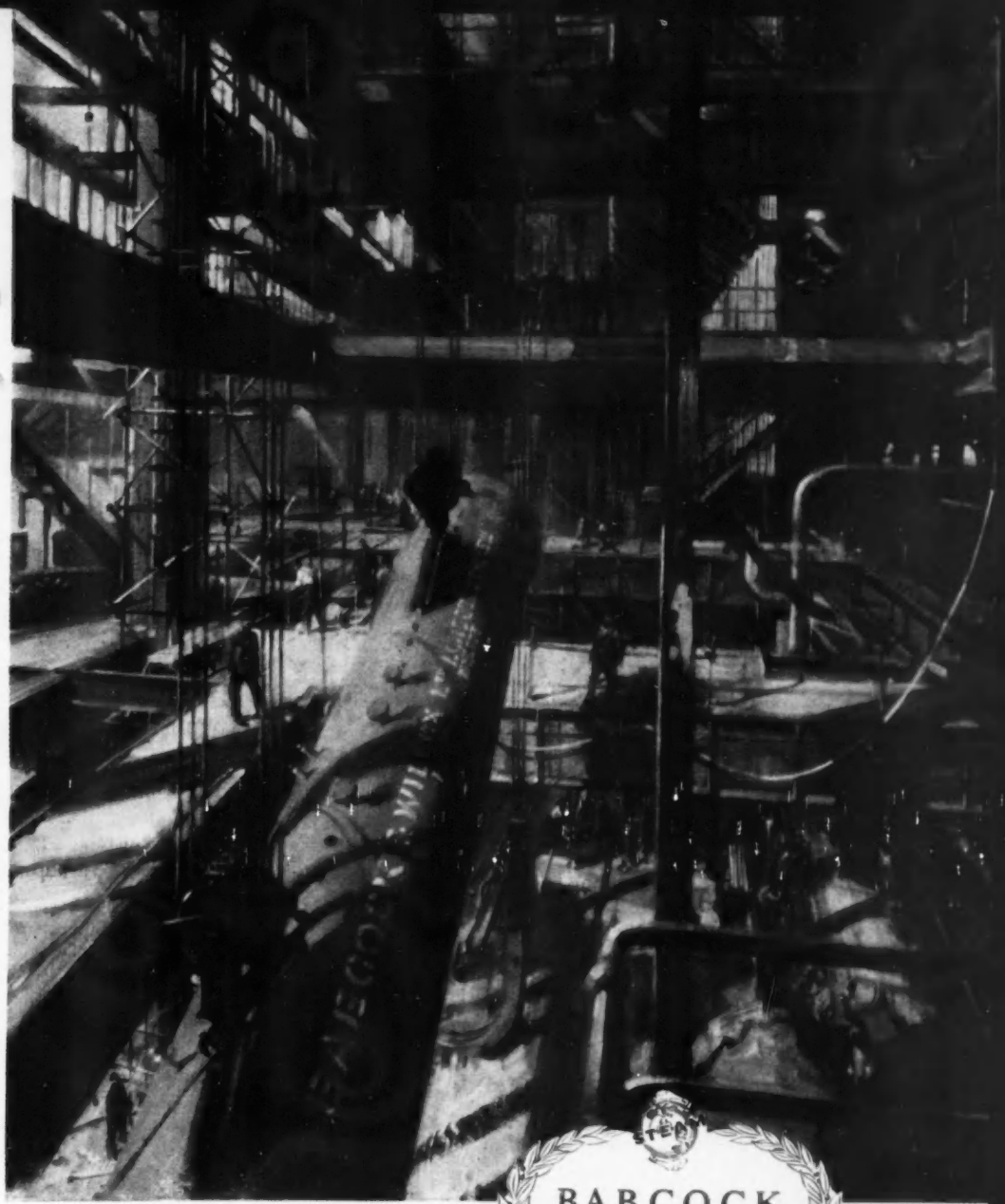


BABCOCK

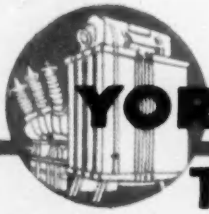
## THE DRUM LIFT

Lifting a small steamship to the Whispering Gallery of St. Paul's would excite no little comment. Lifting the high-pressure steam drum of a large boiler, although a comparable task, passes unremarked. It is undertaken as a matter of routine many times a year, in many parts of the world . . . another Babcock boiler is being erected.

**BABCOCK & WILCOX LTD., BABCOCK HOUSE, FARRINGDON STREET, LONDON, E.C.4**

# WORLD FAMOUS FOR RELIABILITY

We are specialists in the manufacture of Power Transformers for Generation, Transmission and Distribution. Every transformer is entirely manufactured in our works. Ratings up to 60,000 kVA. Voltages up to 132,000 volts.



## YORKSHIRE ELECTRIC TRANSFORMER Co LTD

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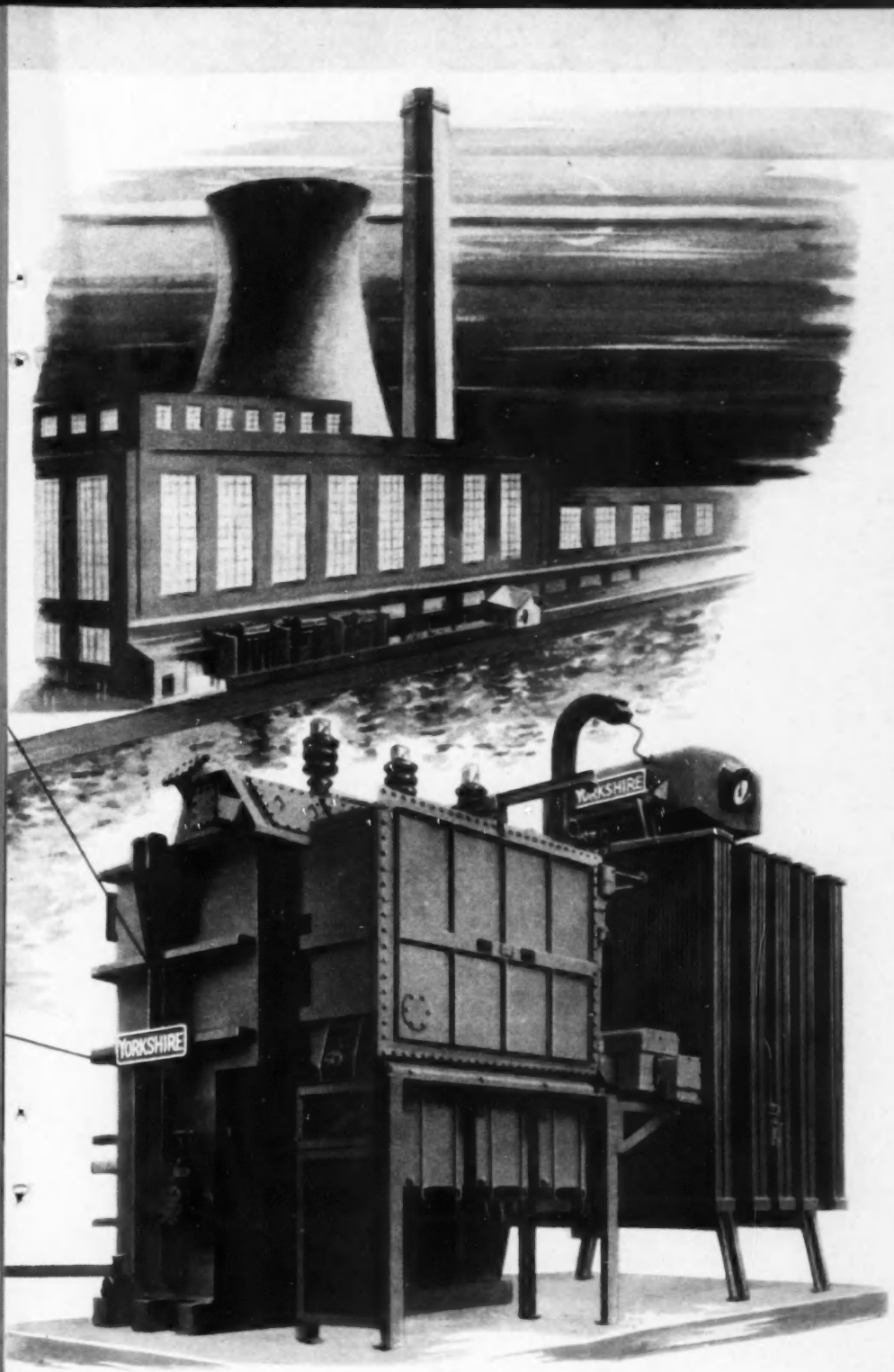
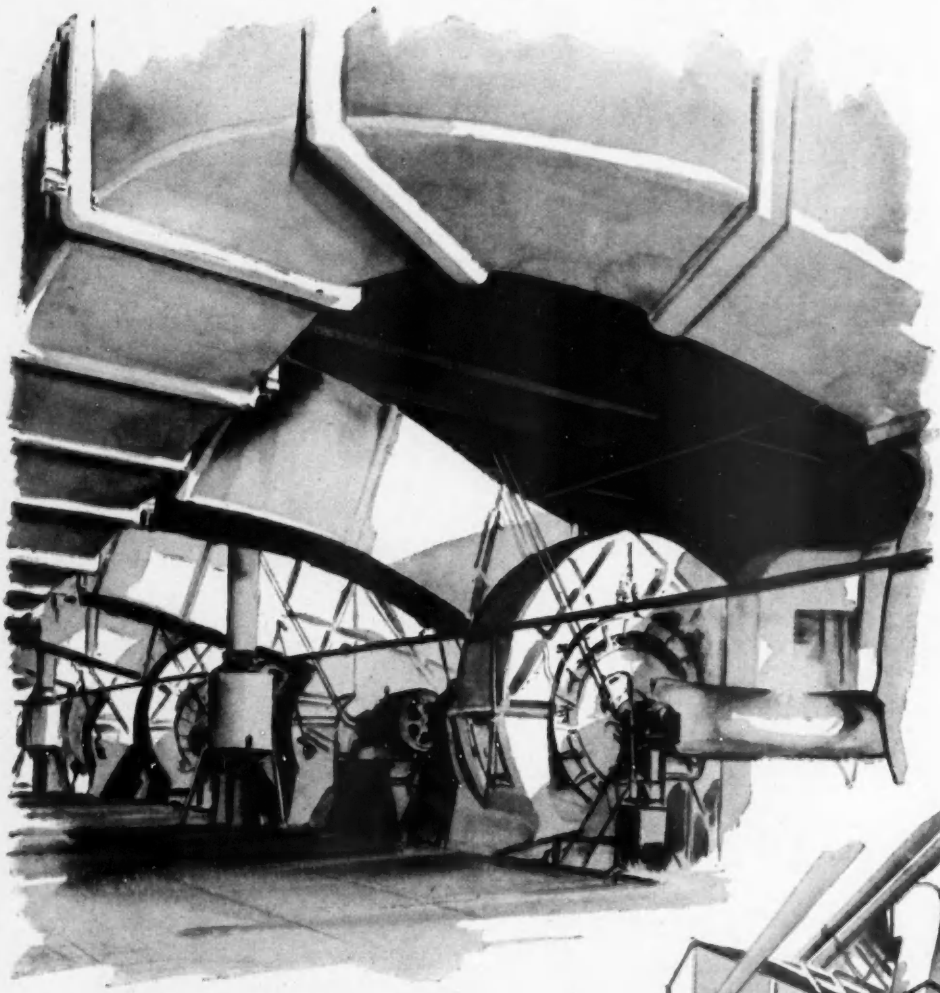
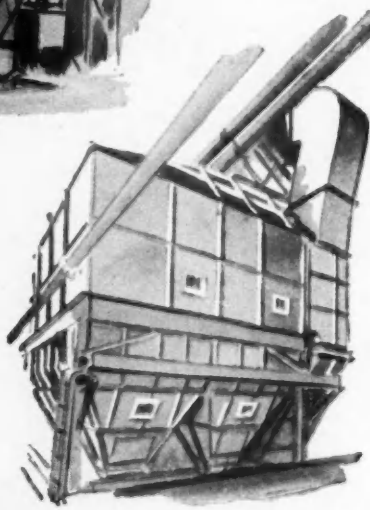

YORKSHIRE
YORKSHIRE



Howden induced draught fans with scroll collectors, at a south coast generating station
Below: Howden Centicell dust collectors at a London Power Station.



# HOWDEN

JAMES HOWDEN & COMPANY LTD., 195 SCOTLAND STREET, GLASGOW, C.5, & 15 GROSVENOR PLACE, LONDON, S.W.1

# PHILIPS FLUORESCENT LAMP STARTER CUTS MAINTENANCE COSTS

## *Fits practically any holder*

The Philips K.3080 Fluorescent Lamp Starter ("Glow" type) cuts maintenance costs in two ways.

### 1. LONGER LAMP LIFE

The controlled delay (patent applied for), built into the Philips Starter, ensures that the lamp electrodes are properly heated before the mains voltage is applied between them. This gives "clean" starting, and lengthens the life of the lamp, since repeated "blinking" inevitably reduces lamp life.

### 2. EASIER STOREKEEPING— SIMPLIFIED STOCKS

Any starter, either glow type or thermal, designed for a 4-contact holder, for 80W. 5 ft., 40W. 4 ft., 30W. 3 ft., 200-250 A.C. lamps can be replaced by the Philips K.3080. Think what this means in simplifying stocks—one type for practically every purpose. With just this one type of starter in his kit, the maintenance man can cope with any need.

### *Sensible Packing*

*Each starter is packed in a separate protective carton carrying technical description and circuit diagram. The outer box, containing twelve starters, makes a compact, convenient pack for the stores, and an attractive display for the counter.*

**PHILIPS**

**PHILIPS ELECTRICAL LIMITED**

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RADIO AND TELEVISION RECEIVERS · TUNGSTEN, FLUORESCENT, BLENDED AND DISCHARGE LAMPS AND LIGHTING EQUIPMENT · 'PHILISHAVE' ELECTRIC DRY SHAVERS · 'PHOTOFLUX' FLASH BULBS, ETC.

(LD.206)

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**TRANSFERS** are *"eye-catchers"* that make their **mark!**

*...and* **"Astra" Transfers are the answer**

Window Transfers and Pelmets, Bus-back and Transport Markings. Brilliantly coloured—eye-catching—"Astra" Cellulose Waterslide Transfers are doing their job—the vital link with your product at point-of-sale. Use this practical method to promote bright selling aids.

To make your mark. Transfers are the easy way of brand-marking your products. Also for industrial markings including decoration.

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● **LET US QUOTE YOU**
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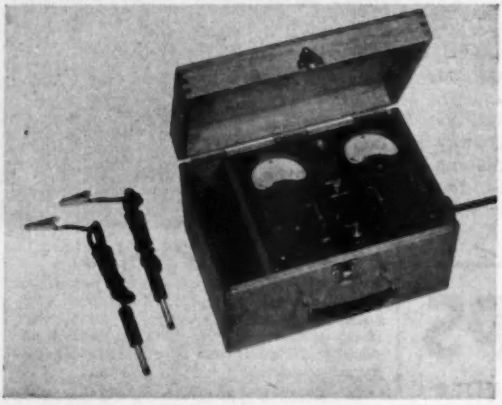
# 'LOOPMETER'

FOR TESTING EARTH FAULT LOOP RESISTANCE



*Indispensable to:—*

- **Supply Engineers**
- **Factory Maintenance Engineers**
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**A method of testing as advocated by Government Departments**

**JOHN DRUMMOND (ENGINEERS) LTD.**
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*Manufactured under Licence from Ministry of Supply.*

# TYPE "RA" RING MAIN UNIT

- 11 & 6·6 kV
- UP TO 250 M.V.A.
- FULLY CERTIFIED TO B.S. 116
- INDOOR
- SHORTLY AVAILABLE IN OUTDOOR FORM

SWITCHGEAR & COWANS LTD
MANCHESTER 16

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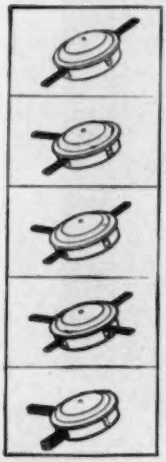

*The new "Ashley" Selective Entry Junction Box (Prov. Pat.) ensures quicker and easier connections in twin flat T.R.S. wiring.* **MATERIAL.**—All Bakelite. **ENTRIES.**—Four open slots each for one 7/.029 or two 3/.029 cable. Unused entries closed by selective shutters on the indexed cover, held by a single captive screw. **TERMINALS.**—Four heavy block terminals, non-twisting in moulded sockets for extra strength and internal insulation. Each securely clamps up to three 7/.029. Also available without terminals. **DIMENSIONS.**—Dia. 3¼ in. Height 1 $\frac{1}{32}$ in. Ample cable slack space. **FIXING.**—Two reinforced $\frac{9}{16}$ in. dia. holes at 2 in. centres in base. Also available with No. 6 by 1½ in. R.H. woodscrew for single screw fixing and cover retention. **COLOURS.**—Brown or Black or White. B.S.S. Complies with B.S.816. **LIST PRICE.**—Cat. No. J.301 Brown. 20/- doz. **DELIVERIES.**—Immediate, from all "Ashley" Wholesale Distributors.

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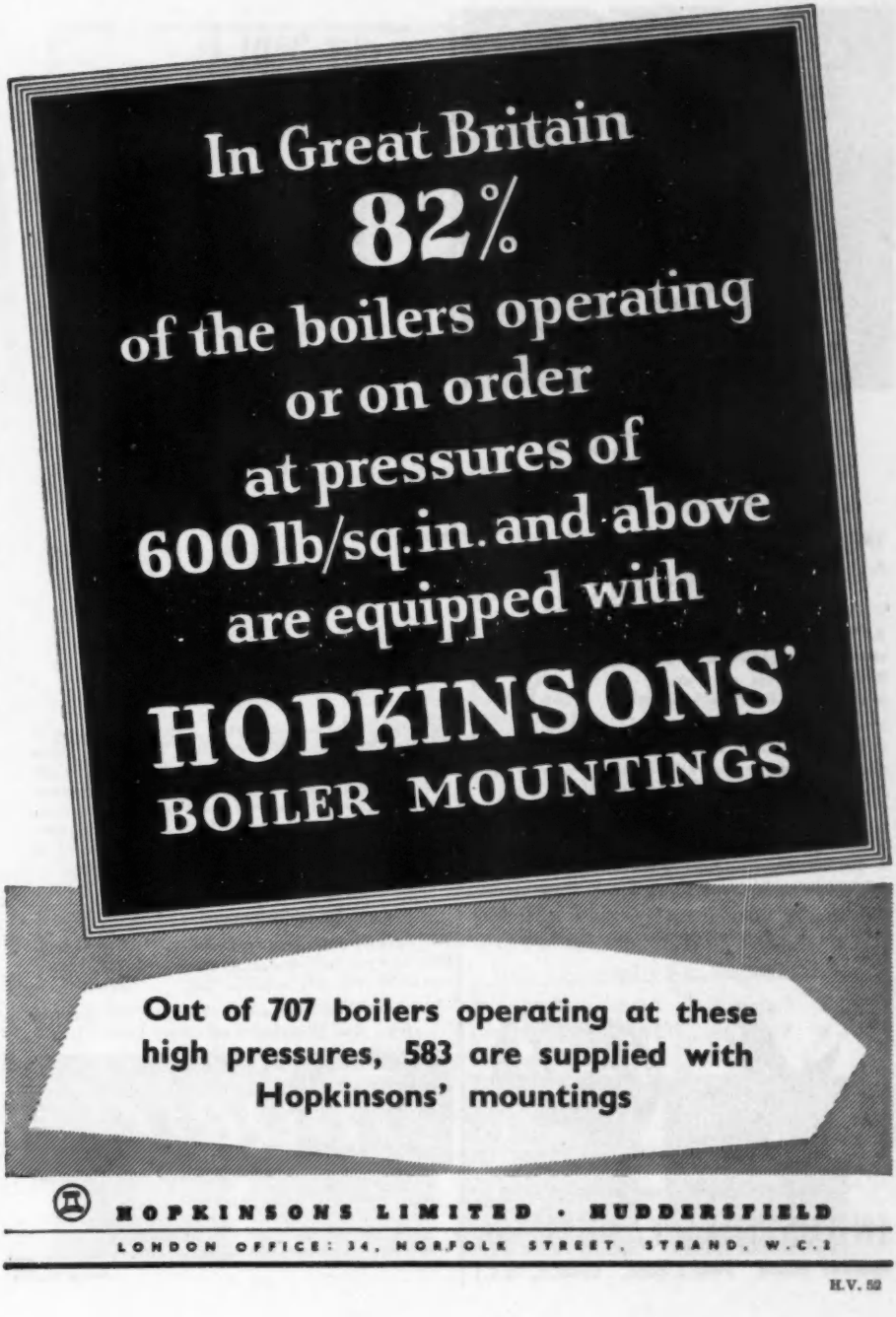


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LONDON OFFICE: 34, NORFOLK STREET, STRAND, W.C.2

H.V. 52

# Industry

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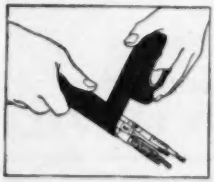
*A good insulator and a versatile electrical tape.*

1. Thin, strong, pliable. 2. Moulds to shape under tension of application. 3. Resistant to oils, acids and moisture. 4. Withstands weathering and extremes of heat and cold. 5. Does not discolour or corrode copper. 6. Available in colours and also printed.

SPEEDFIX **INSULATING TAPE**

1. Six coatings. 2. Pure rubber adhesive only: on BOTH sides. 3. Clean to handle. 4. Does not dry out. 5. No pin holes. 6. Dielectric strength 1,500 V. 7. Two year storage guarantee on every roll.

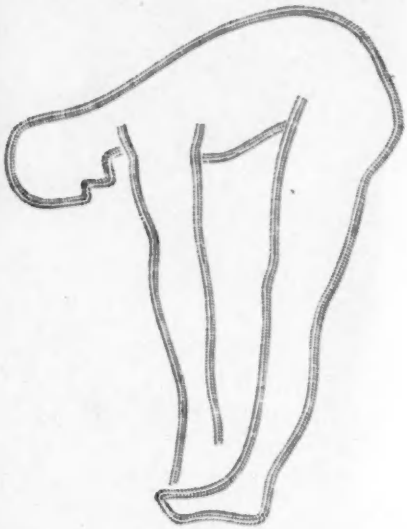


*Free samples gladly sent on request.*

**INDUSTRIAL TAPES LTD.**

**Speedfix House, Duke's Road, London, W.C.1**

# . . . our bent is tube bending equipment



WE specialise in the design and manufacture of machines for tube bending. These machines are particularly suited for use with steam and gas tubing—copper tubing—electricians' conduits—light gauge solid drawn brass tubing—aluminium tubing—light gauge steel tubing and many other types up to 3" in diameter. With these there is also a unique bending unit designed to facilitate the bending of ¼" to 2" steam gas tubes through 180°. Full service facilities are available and we will design special machines for any kind of job.

***Enquiries should be made through your machine tool distributor or direct to:***

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Elwyn Hughes

# A great NEW SERIES of Thermovent

ELECTRIC SPACE HEATERS

Entirely re-styled and re-designed from basic principles, these superb new Thermovent heaters are a great advance in streamlined efficiency. Of two main types, 'FR' plastic-cased portable and 'SR' steel-cased, an important feature is the new high-efficiency element with a duct assembly having greater cross-sectional area and lower air resistance than previously. Result — greatly increased air circulation, lower temperature rise through the heater, reduced air exit temperature, all contributing to a remarkably high standard of SAFETY.

★ **Entirely *new* designs!**

★ ***New* high-efficiency duct system!**

★ ***New* distinctive styling!**

★ ***Highest-ever* SAFETY factor!**

★ **New 'easy-clean' grille, keeps cool!**

★ **New automatic heat control with Indicator Lamp and locking device!**

***A BOLD STRIDE FORWARD IN ELECTRIC CONVECTION HEATING!***

**'FR' SERIES**

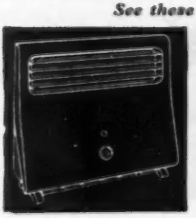
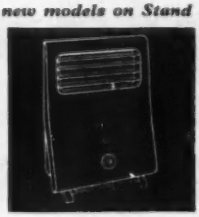
Polished walnut plastic front panels with 'old gold' easy-clean grilles. Fitted luminous effect. Thermostatic models have an entirely new type of control and pilot lamp. Available in 1 Kw. and 2 Kw. loadings.

**'SR' SERIES**

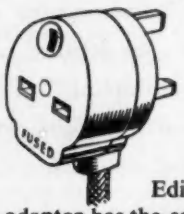
Metal-cased type, floor standing or wall-fixing, enamelled light bronze. Fitted with luminous effect. Thermostatic models have the new type control. Available in 1 Kw., 2 Kw. and 3 Kw. loadings.

*The Thermovent range of equipment has been greatly extended. Full details from* **THERMOVENT HEATING, E. K. COLE LTD., 5 VIGO STREET, LONDON, W.1**

***See these new models on Stand 14A, B.E.P.C. Exhibition, Torquay***

# Re-fused in 15 seconds




The new Ediswan plug adaptor has the same simple re-fusing device. This adaptor which is fused and shuttered, can be wired to an appliance in place of a normal plug. A second appliance can then be operated from the adaptor outlet.

Only fifteen seconds is needed to replace a fuse in an Ediswan rectangular pin plug. Merely insert a sixpence in the screw head, turn and the fuse is ejected. Turn back and the re-fusing is complete. No need at all to dismantle the plug.

A Catalogue and price list of the complete range of Ediswan Electrical Accessories is available on request.

| | | Cat. No. | List Price |
|---|---|---|---|
| Plugs | Brown | 4434 | 44/- Doz |
| | Ivory White | 4436 | 51/4 Doz |
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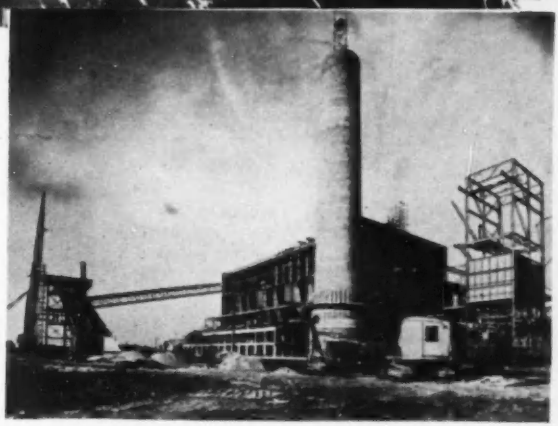

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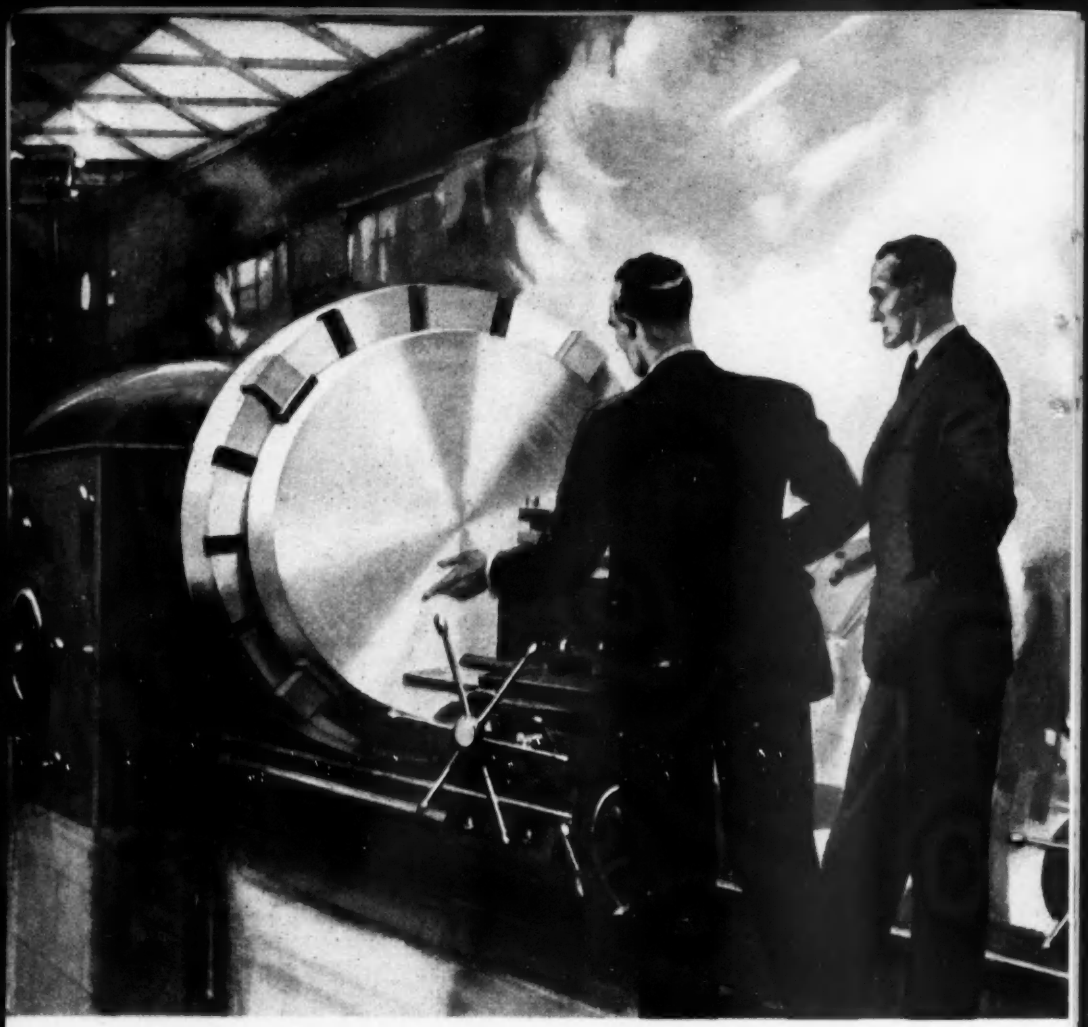

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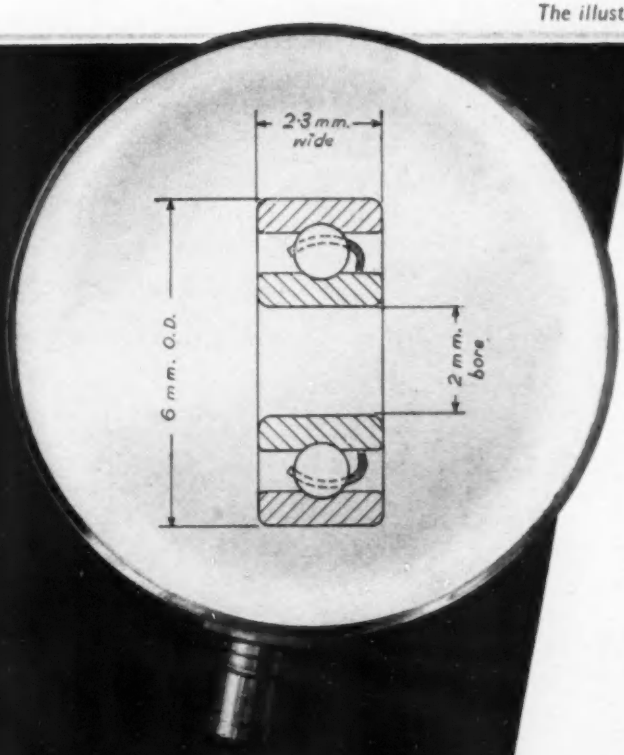


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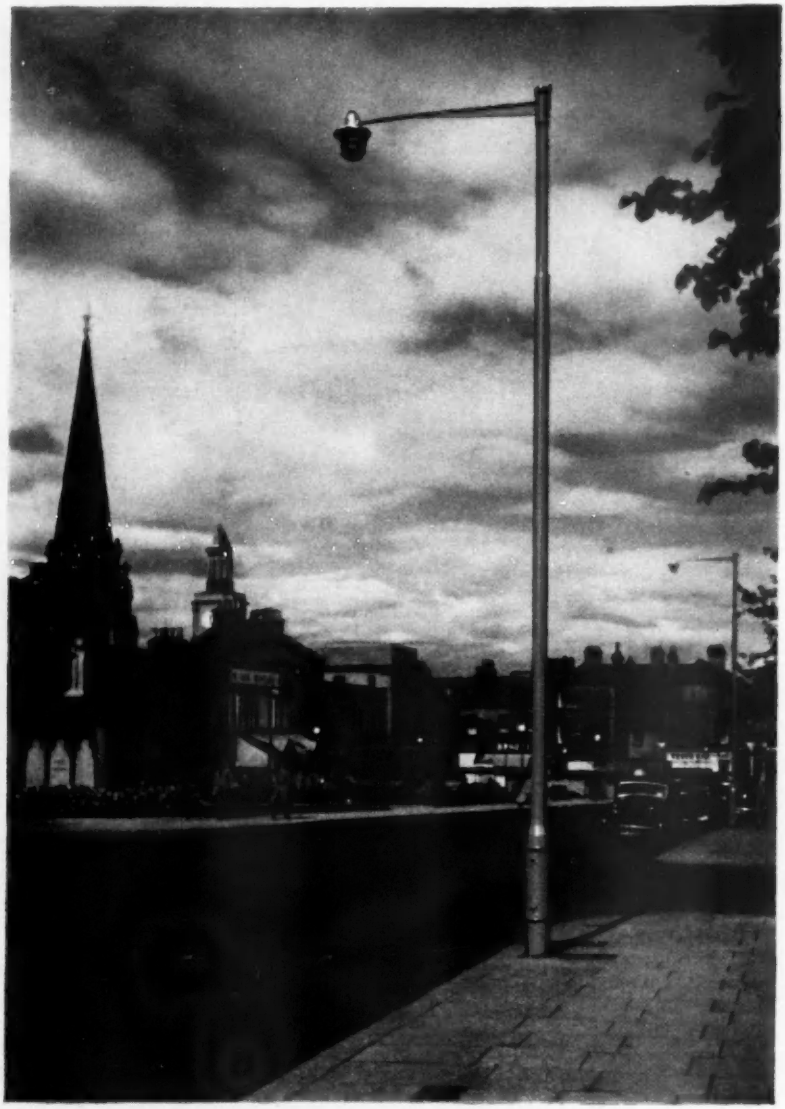

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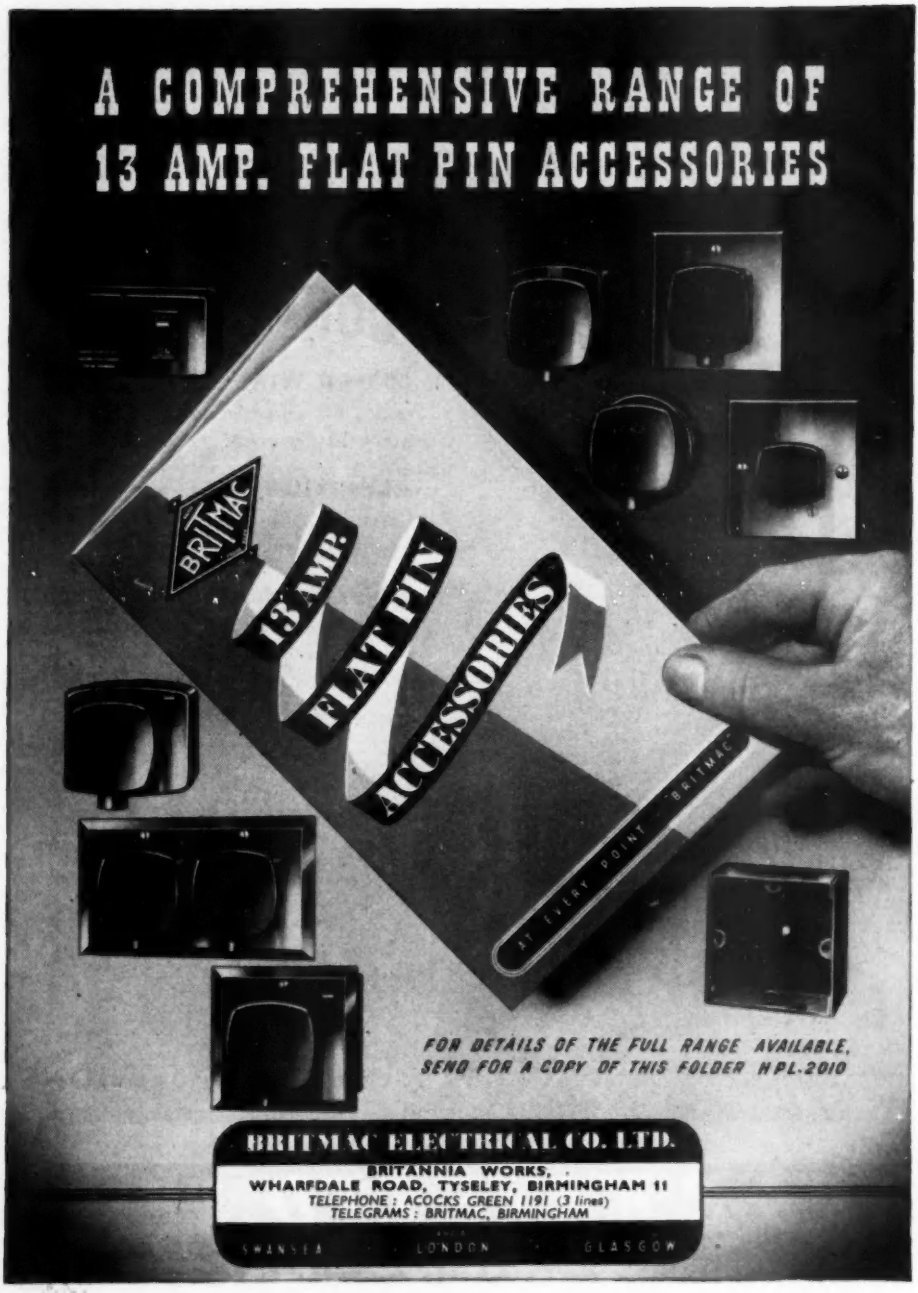
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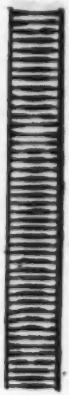

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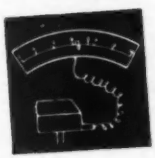

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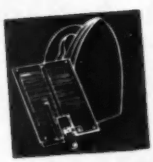

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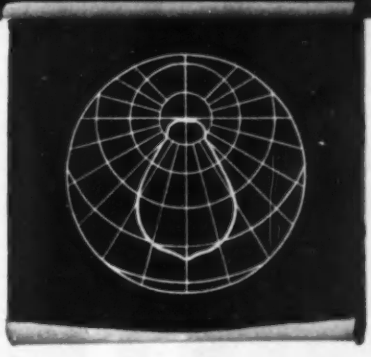

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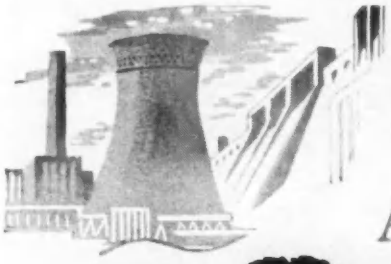

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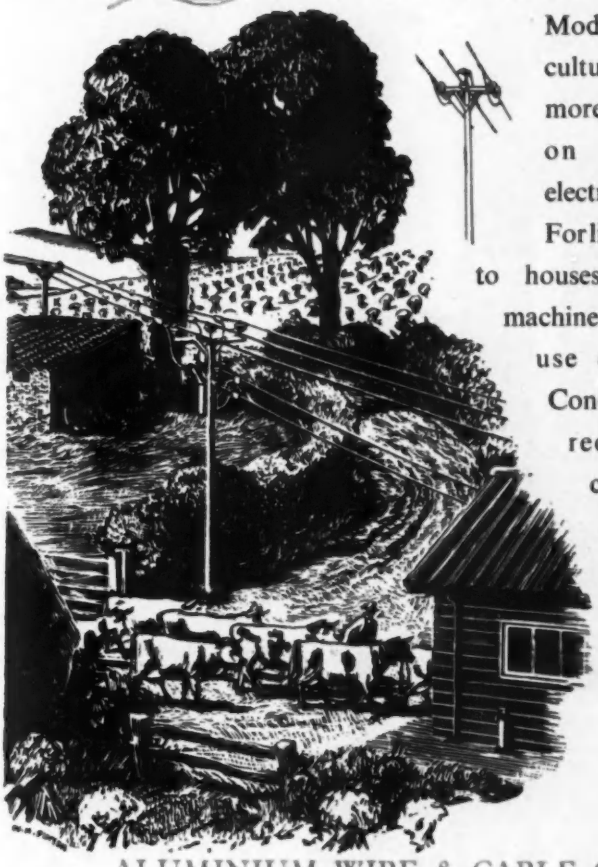

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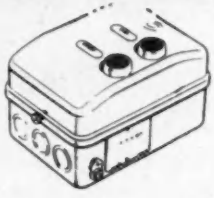

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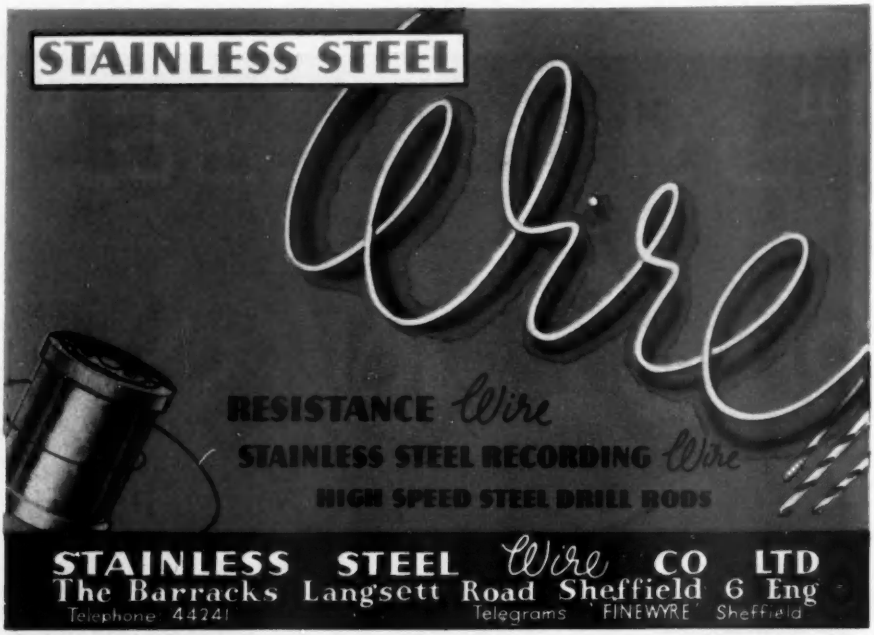


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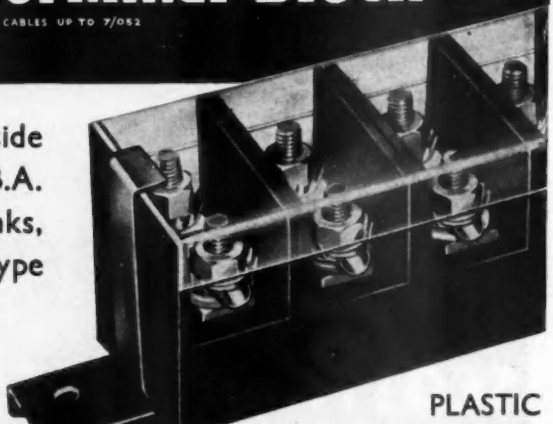

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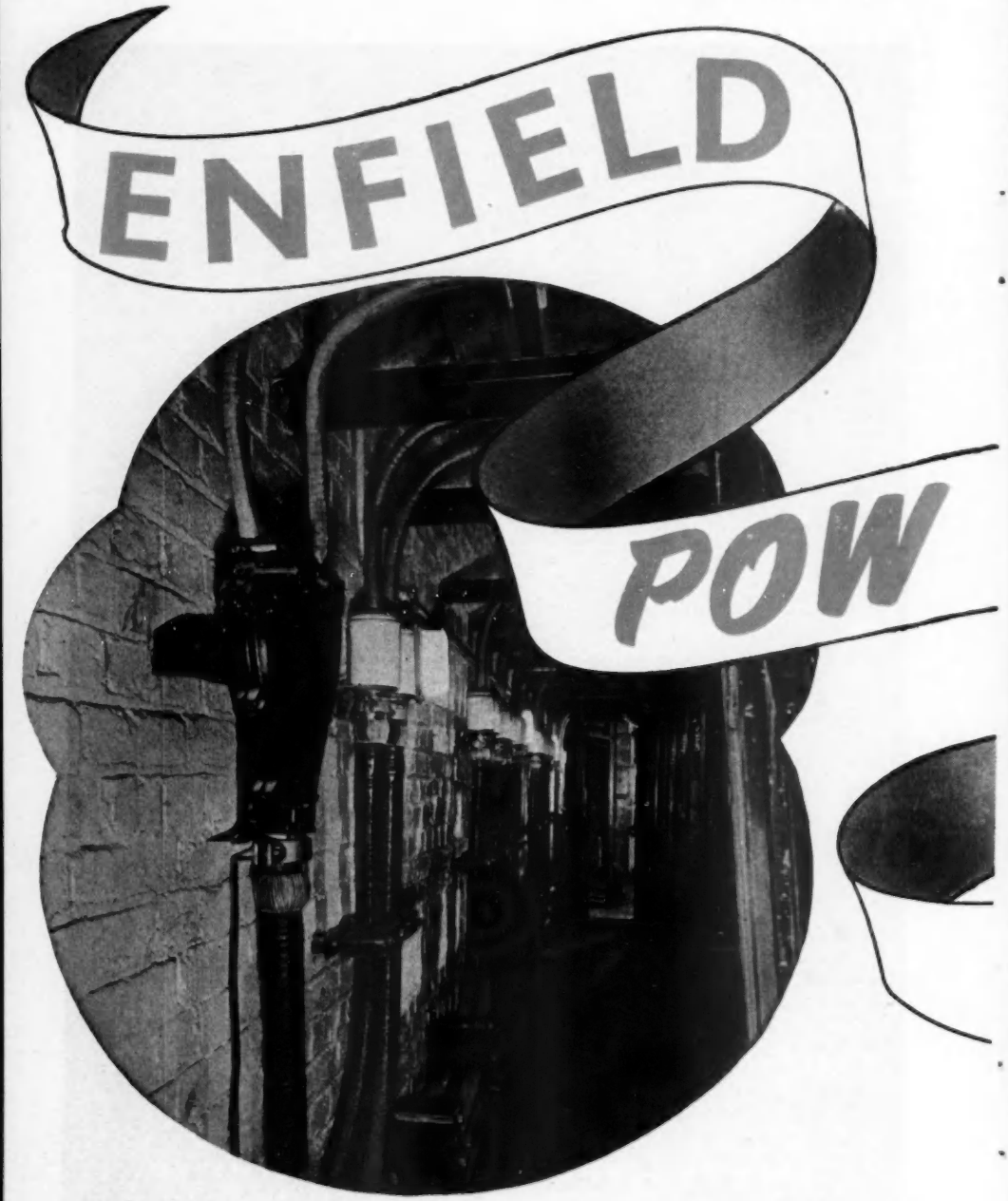


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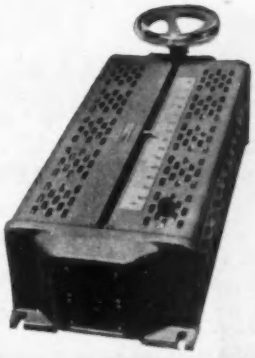

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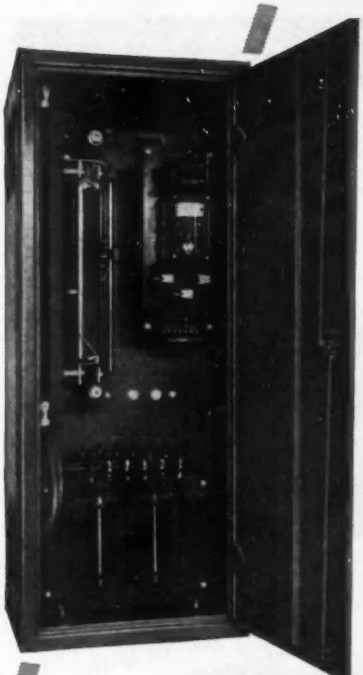

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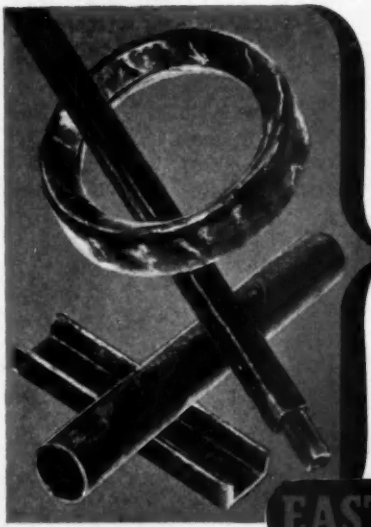

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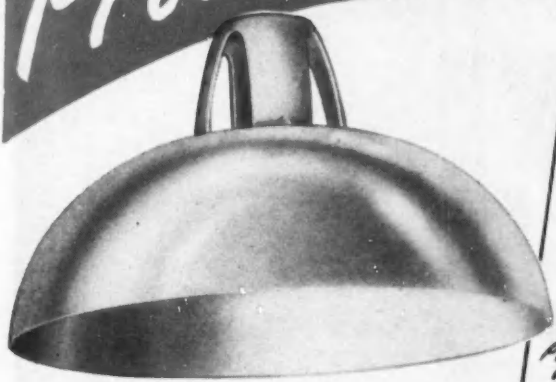

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~~5/8~~ 9 in. diameter
~~plus P.T.~~ now 4/8
Plus P.T. at 18⅓% list price

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Benjamin Coolicon Shades have always been in the lead for sensible scientific design, range, value and quality.

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is the answer to the need for pleasing lighting that protects young eyes. Gaily decorated durable plastic, glazed to withstand repeated washing.

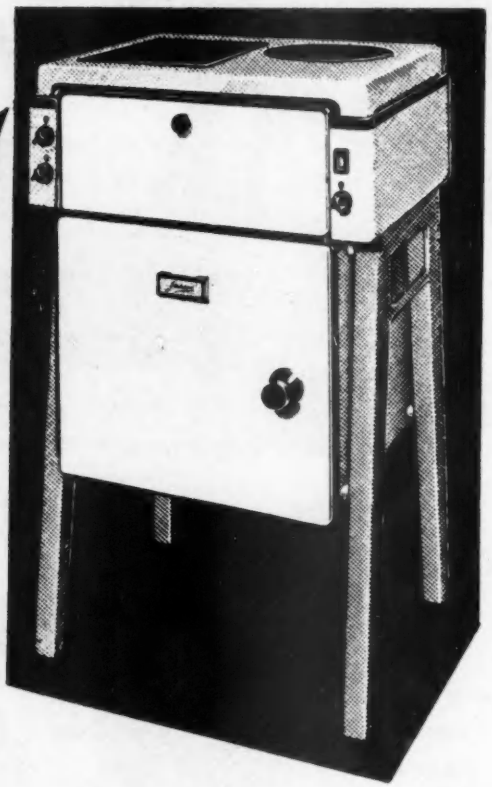
*No change in price.*

*Price* **8/-** *plus P.T.* **1/6**

# Jackson revolutionize Electric Cooker Design *with the*

Jackson

## 'Two-Ninety'



Look at these selling features:

1. *Light weight lift off hob.*
2. *Specially designed spillage channels.*
3. *Hand level controls.*
4. *Fully accessible Hob Assembly.*
5. *Built in towel rail.*
6. *Large capacity oven* (24 *lb. turkey*).
7. *Complete unit wiring assembly.*
8. *Rollers on rear legs for easy movement.*
9. *Lighter colour enamel for oven interior.*

With pride we offer the Jackson " Two-Ninety " as the most outstanding family size cooker at the low cost of £22. 17. 6d. The cooker is available in nice attractive colours, Cream with Pale Green relief, White with Pale Blue relief and All Cream.

**Philip Harben says: " For Satisfaction Sell a** *Jackson*

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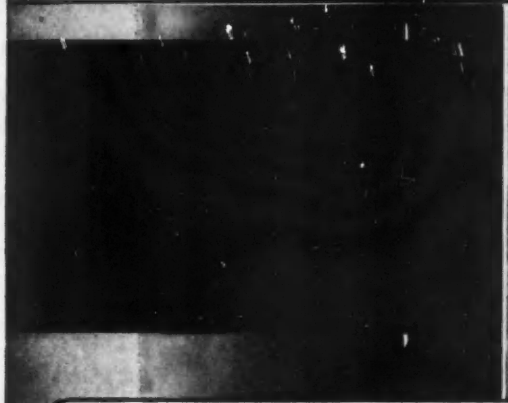
**NORMAL PLATING RECTIFIER**

OUTPUT 8 VOLTS 1000 AMPS

RIPPLE 18%

INPUT 400 VOLTS 3 PHASE

17·9 AMPS



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OUTPUT 8 VOLTS 1000 AMPS

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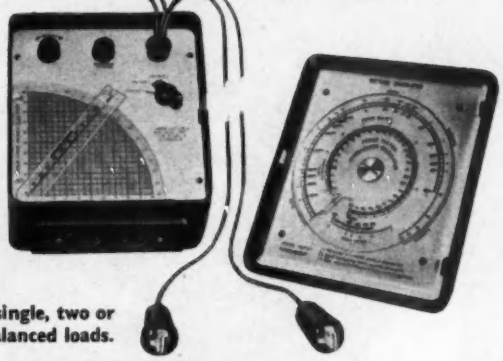
# NEW!

## POWER, POWER FACTOR & REACTIVE kVA

*can now be determined by means of—*

*The Universal AvoMeter*

## POWER FACTOR & WATTAGE UNIT



***This new, simple to use Unit can replace Dynamometer Wattmeters and Power Factor Meters in those instances where :—***

1. **Checks have to be made on single, two or three phase, balanced or unbalanced loads.**
2. **The purchase of costly test gear cannot be justified.**
3. **The use of a dynamometer is not essential.**
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5. **Very low readings are required, which cannot be obtained upon a conventional Wattmeter.**

***This one Accessory, used in connection with its AvoMeter, will cover an enormous range of wattage readings hitherto necessitating the use of several expensive instruments.***

Power Factor readings from unity to zero, and Wattage readings from below 1 Watt to any upper limit (provided that suitable current transformers are available) can be taken upon single, two or three phase, balanced or unbalanced A.C. circuits from 100-450 volts, provided that the normal sinusoidal waveform is present.
The unit will determine the reactive kVA required to produce any degree of power factor improvement from 0·3 on inductive loads.

The Unit will only operate with a Model '7' or a Model '40' AvoMeter fitted with sockets marked "P.F." For some time past, instruments leaving the factory have been fitted with these sockets, but earlier models not so fitted can be modified by us for £3:5:0, plus the cost of any repairs, should they be necessary.

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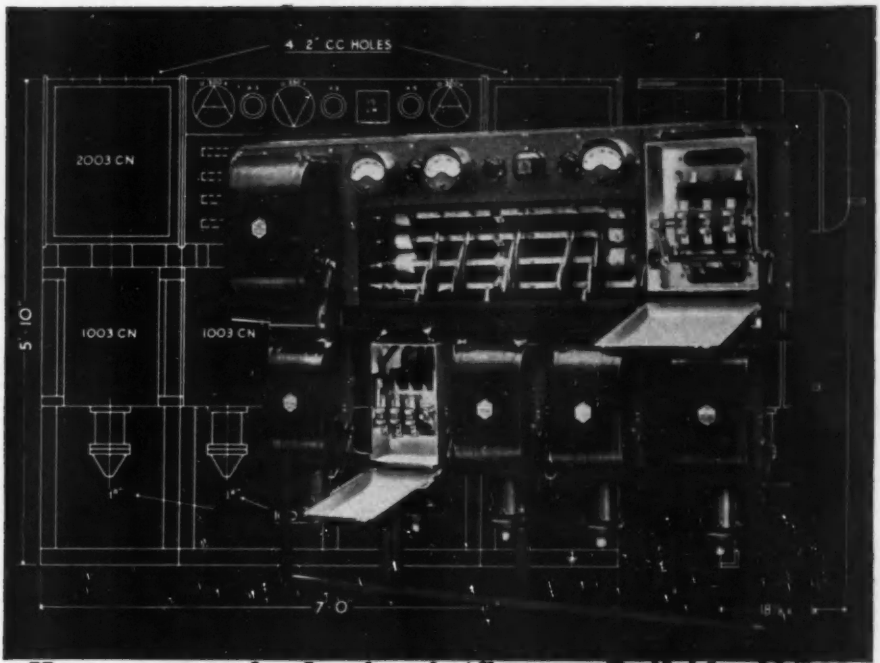


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* One piece steel body increases earthing efficiency.
* Oven interior removable in 3 pieces for easy cleaning and maintenance.
* Special construction of oven door minimises condensation.
* Finished in two-tone ivory vitreous enamel.
* Quick heating-up, only 16 mins. to 350° F.

***A LARGER OVEN, ADDED ECONOMY IN RUNNING— and these important technical advances****

**SEE IT AT THE BRITISH ELECTRICAL POWER CONVENTION · TORQUAY · JUNE 8-12**

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*Patents applied for.*

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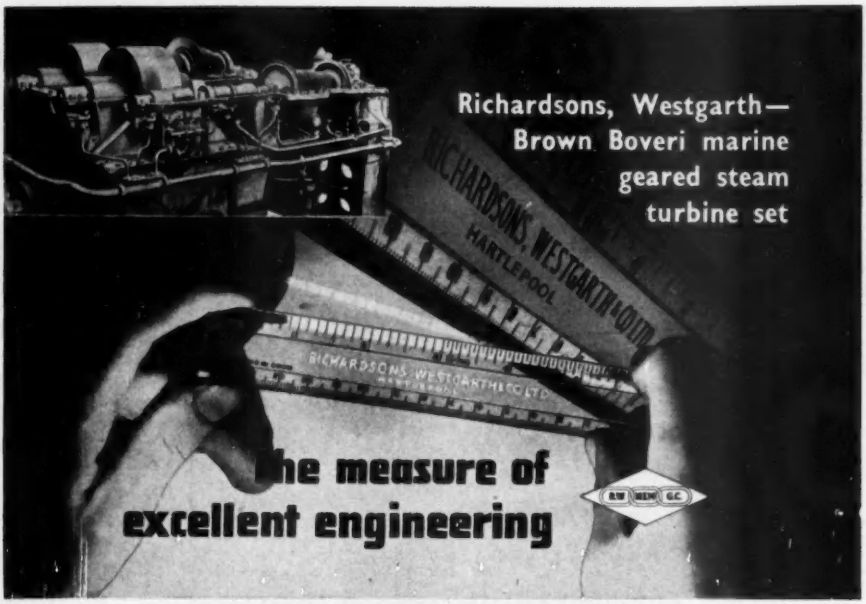
***TO BE BACKED BY LARGE-SCALE NATIONAL ADVERTISING***




STAND 8, ROW G, GROUND FLOOR, GRAND HALL:
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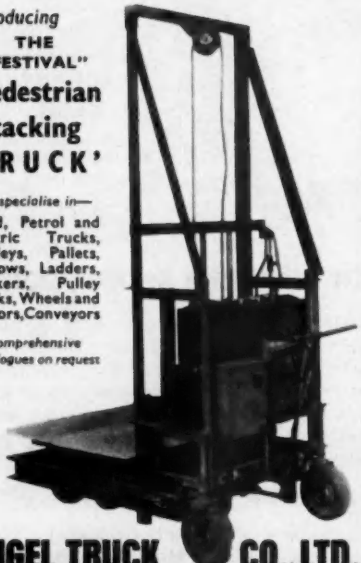

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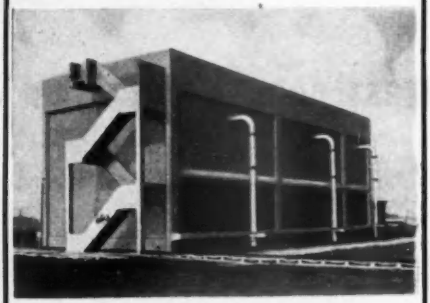

*Illustration of Cellular Mechanical Induced Draught Tower.*

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**with the musical 4-reed alarm.** A fast-heating appliance of gleaming elegance which will grace any home—that's the BEST "Fanfare" kettle. But it's not enough to see it—you must *hear* its pleasant warning chord when the water boils. Capacity 4 pints. Streamlined body of stout copper, polished chromium finish. Bakelite non-conducting handle. Spring-operated spout cap. All parts replaceable. 1500 watt loading. BEST element with automatic safety connector-ejector. 100/120, 200/220, 230/250 volts AC/DC. *Send for leaflet No. 23 for full details and prices.*

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Robust, reliable construction characterises BEST replacement elements. Non-automatic and Automatic Safety Connector-Ejector types. In five sizes from 700-1,800 watts for 2, 3, 4 and 6-pint kettles. Automatic thermal switch (bimetal) elements are available, also higher loadings if required. *Send for leaflet No. 20 for full details and prices.*

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Best Products Ltd.

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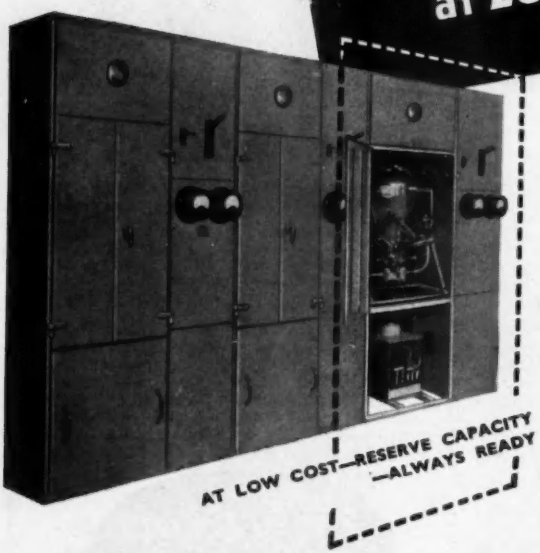
*When a* **RECTIFIER SPECIFICATION** *reads –*

"reserve capacity to ensure continuity of supply"

**Consult *Nevelin* for 'CONTINUITY' at LOW COST . . .**

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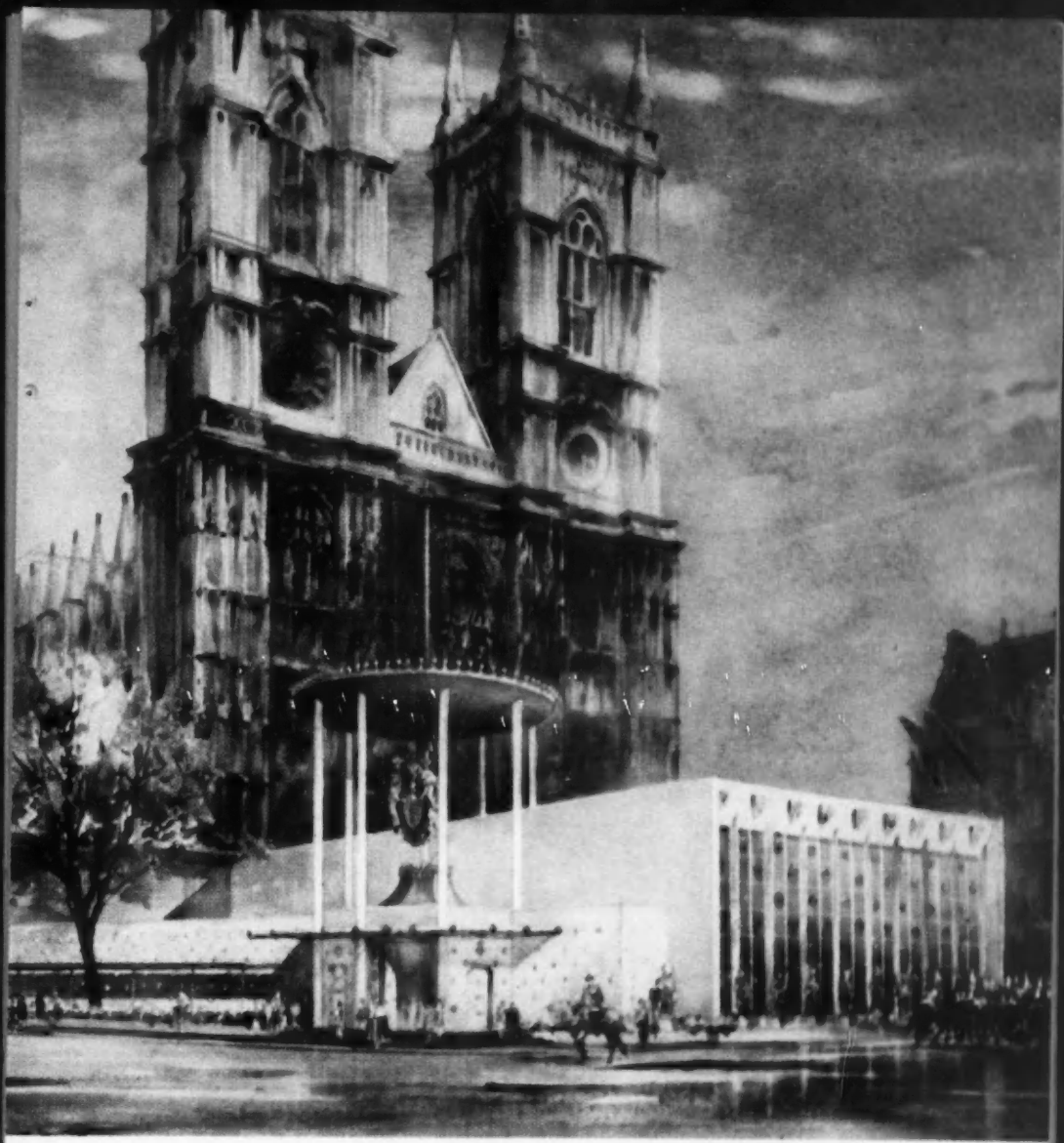

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B.E.P.C. TORQUAY, JUNE 8-12, 1953, STAND 51

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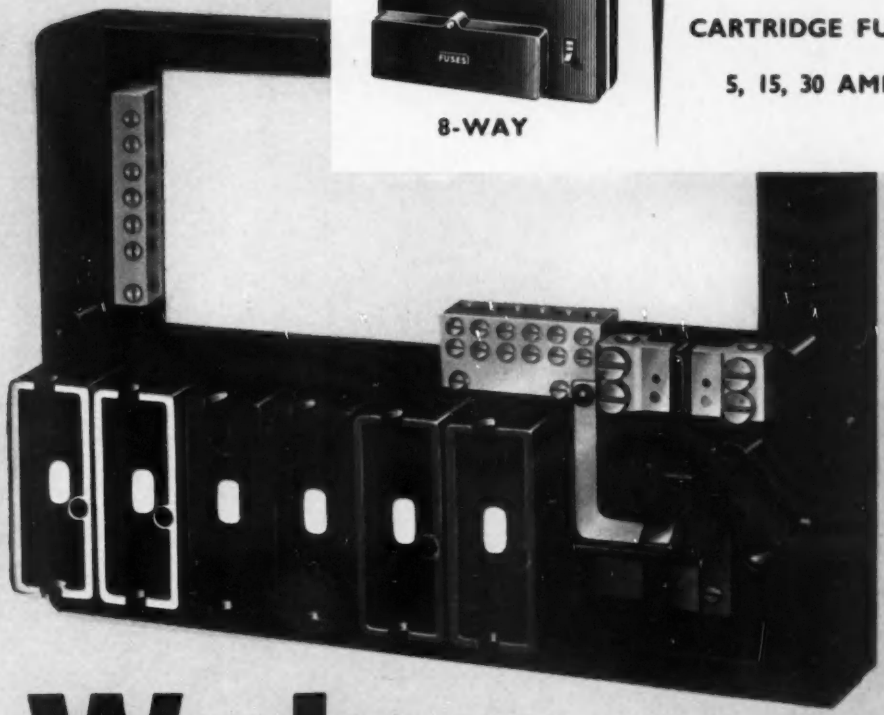

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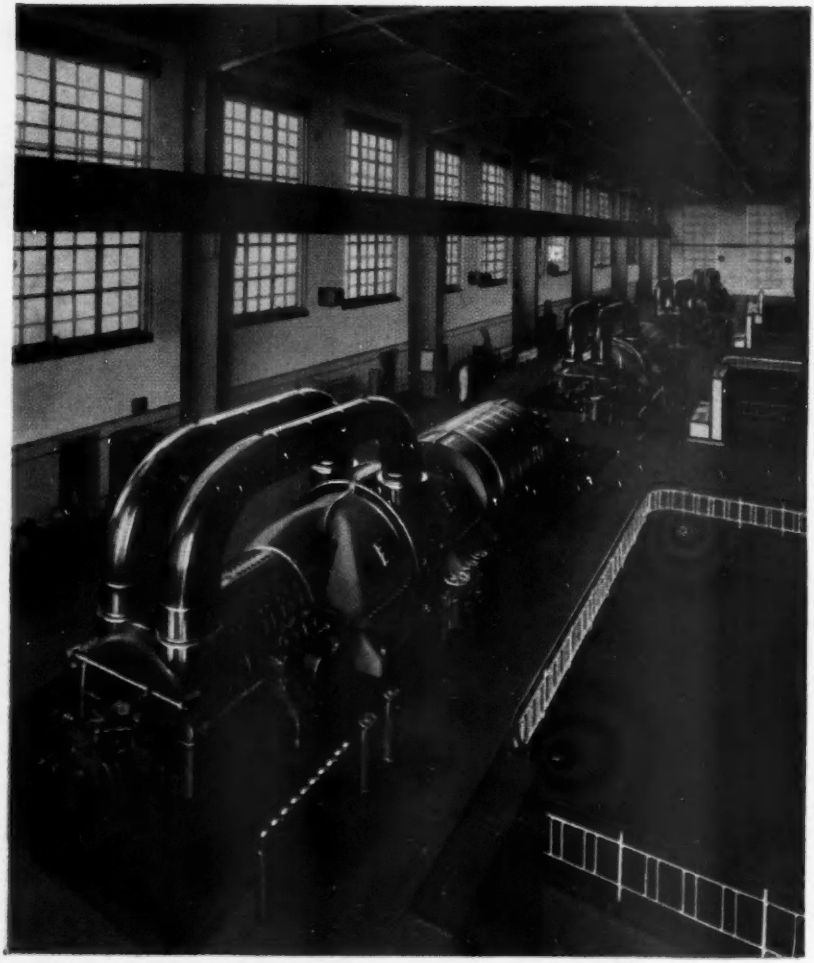

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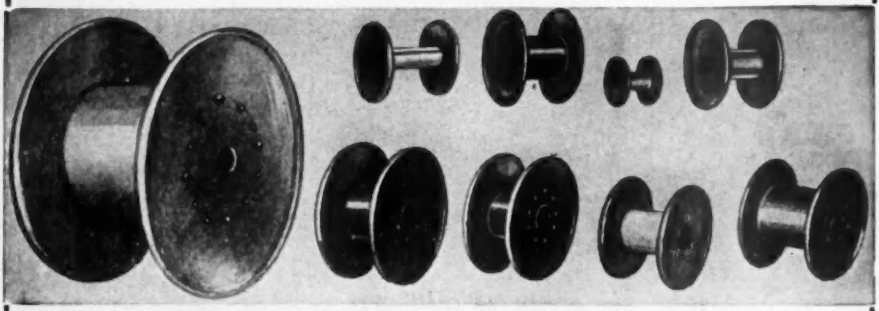

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*Our Speciality:—Steel flanges with very strong beaded edges in a wide range of diameters.*

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*'COSTS LESS THAN ONE PENNY A MONTH TO USE'*

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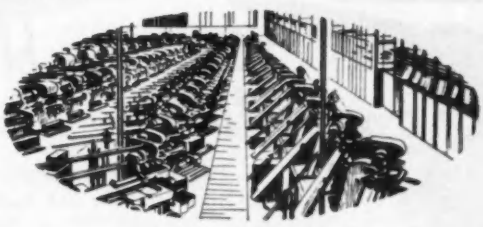

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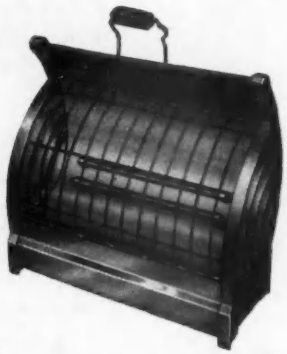

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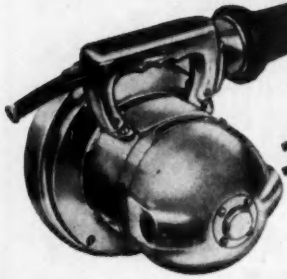

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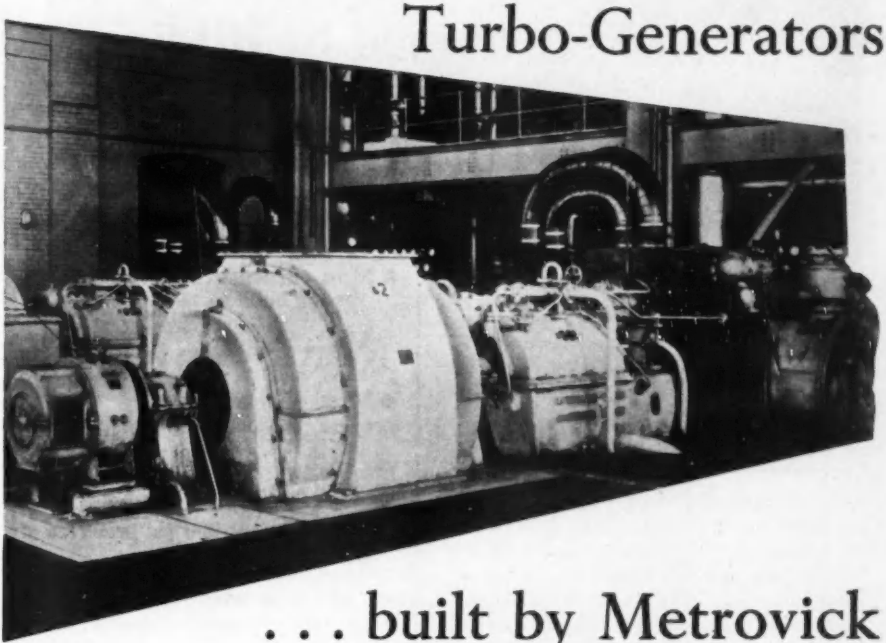
Also at 25 ELMBANK STREET, GLASGOW C.2

# 500 self-contained Turbo-Generators



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METROVICK *Self-contained Turbo-generator Sets*

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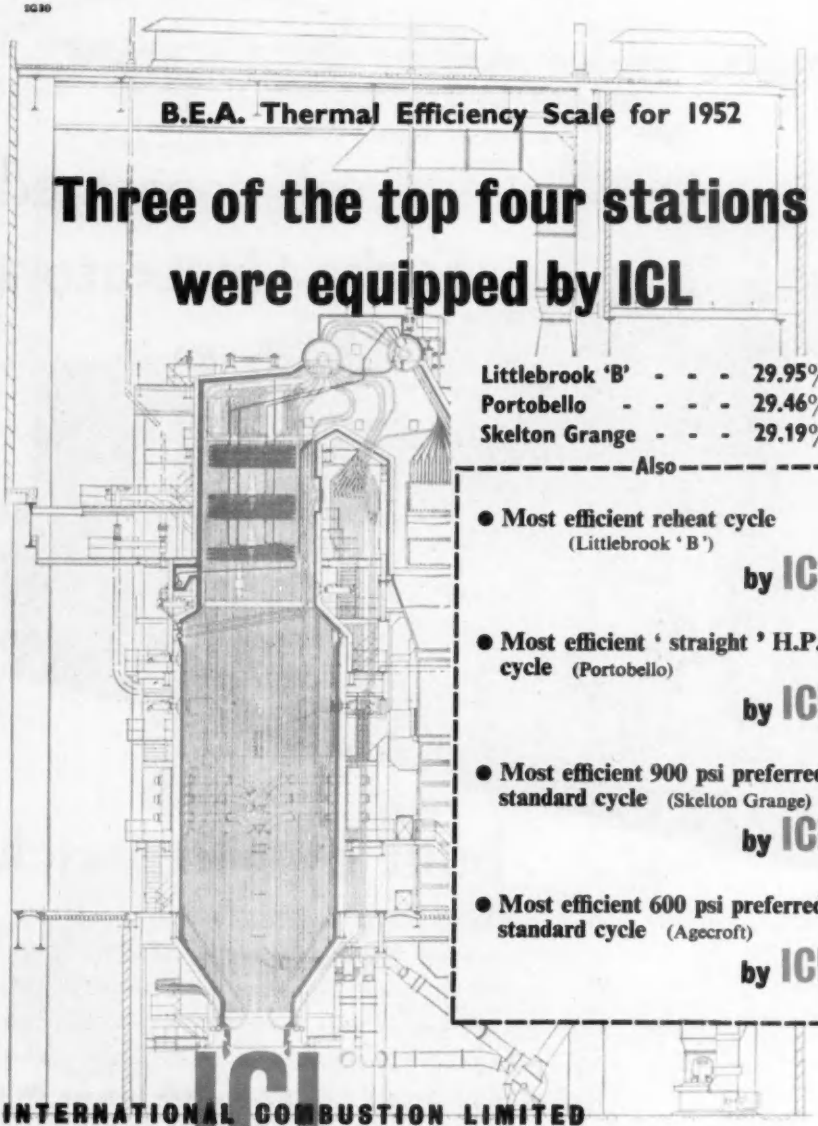

B.E.A. Thermal Efficiency Scale for 1952

# Three of the top four stations were equipped by ICL

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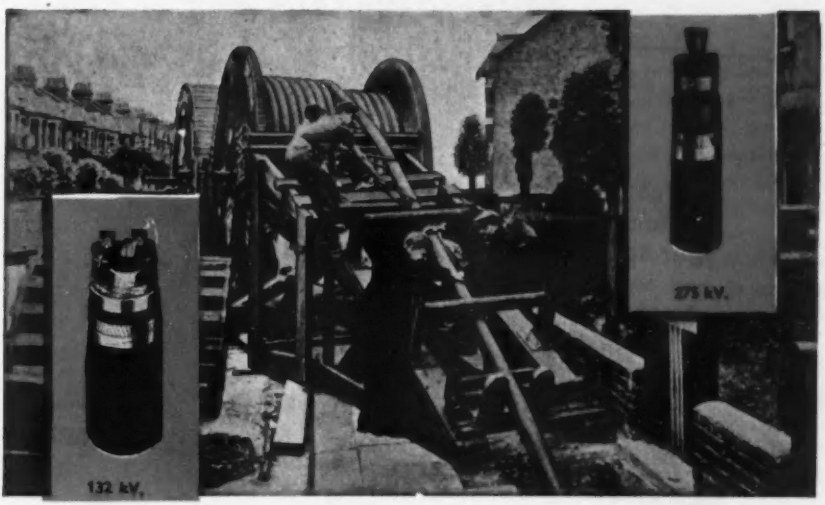


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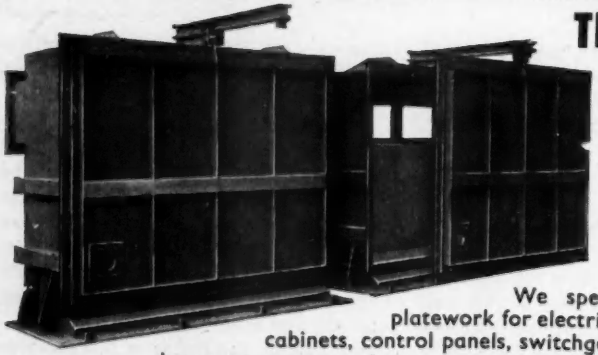

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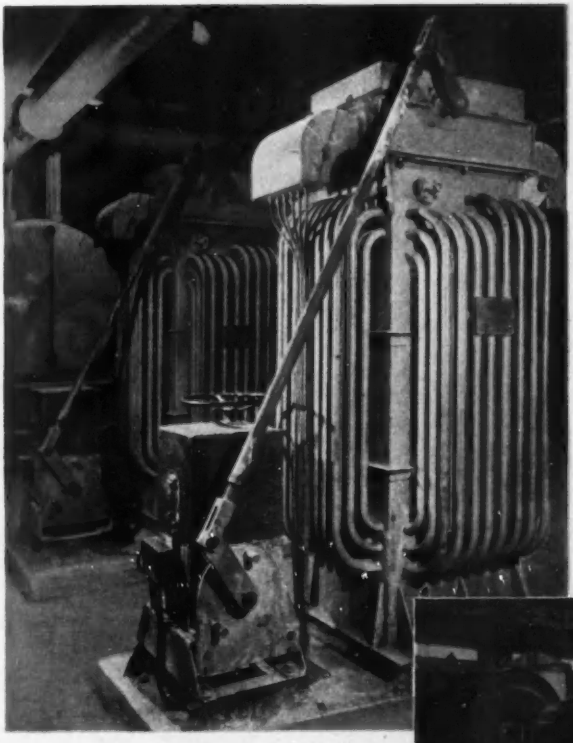

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*Below:* N-S motor, 1500/133 r.p.m., driving re-coiler on a strip processing line.

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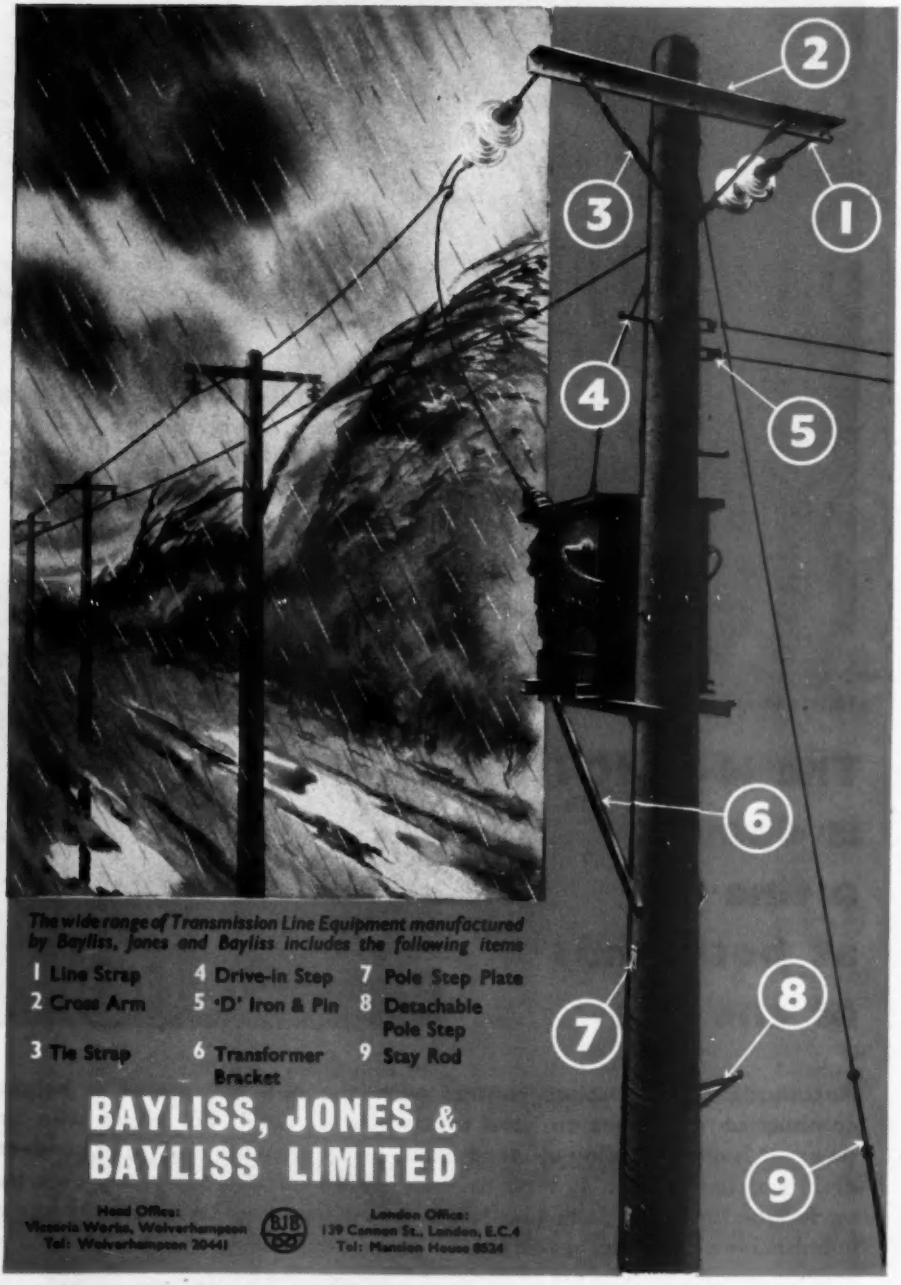


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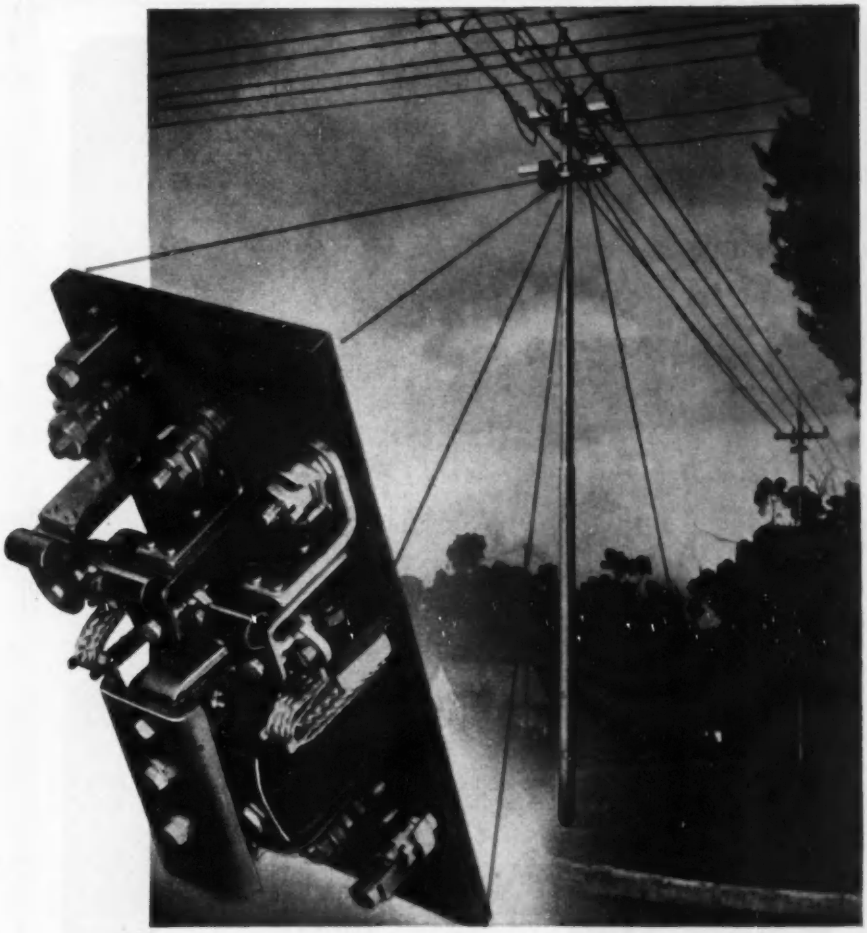

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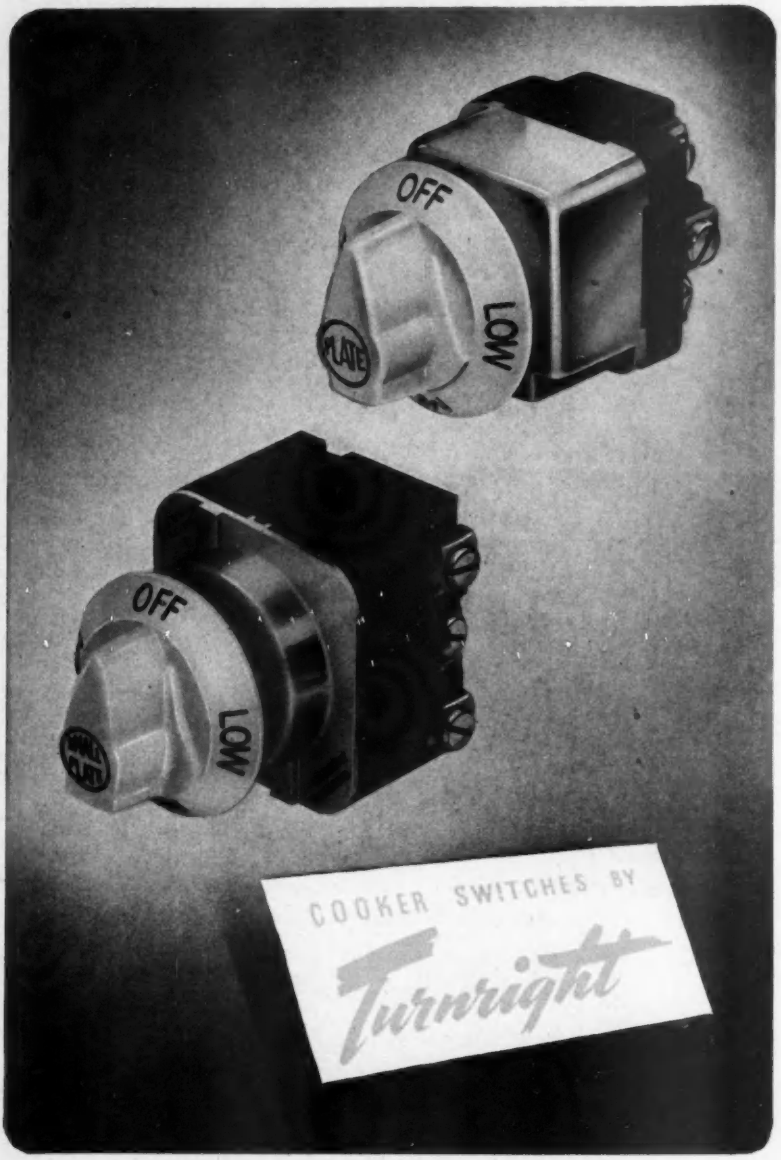


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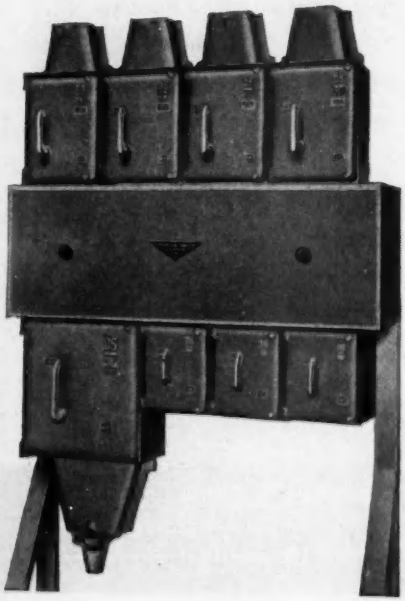

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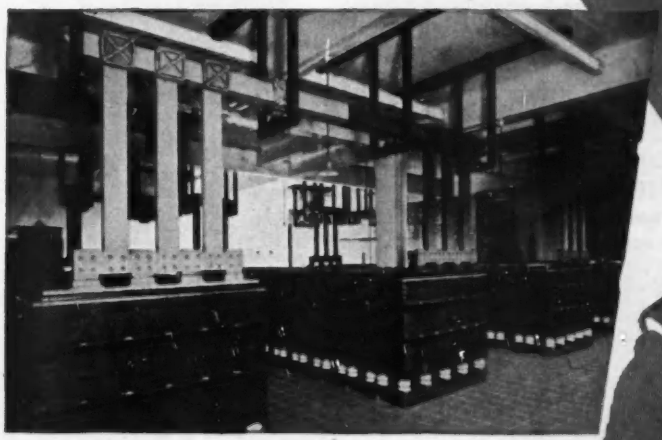

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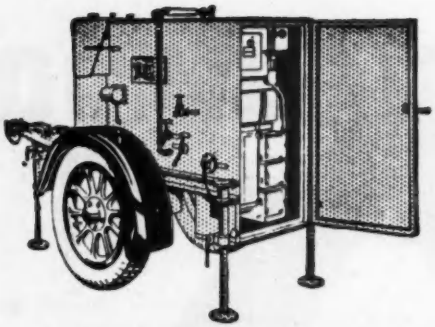

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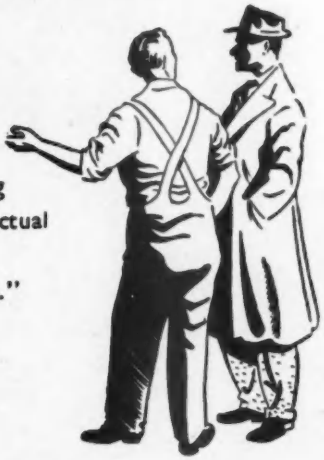

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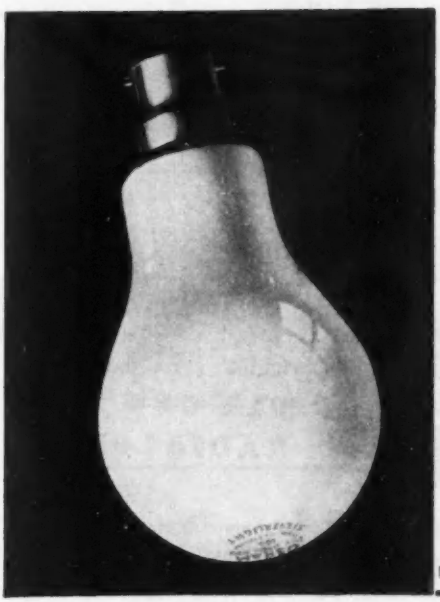

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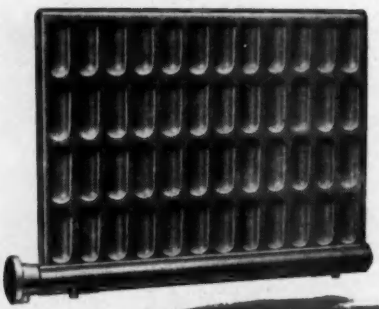

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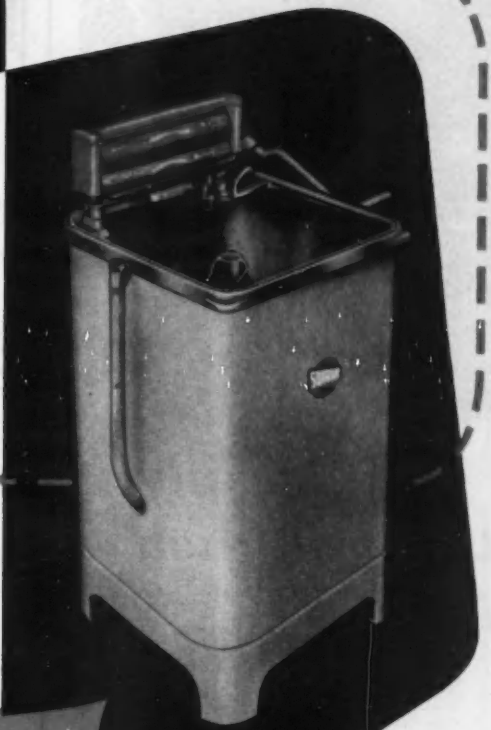

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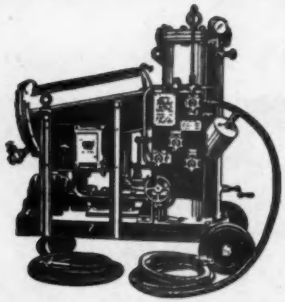

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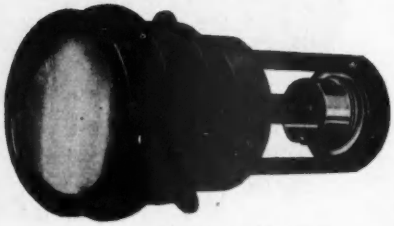

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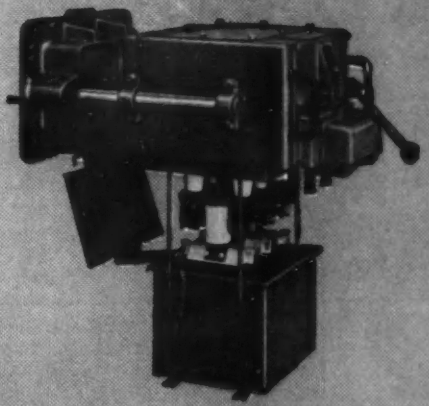

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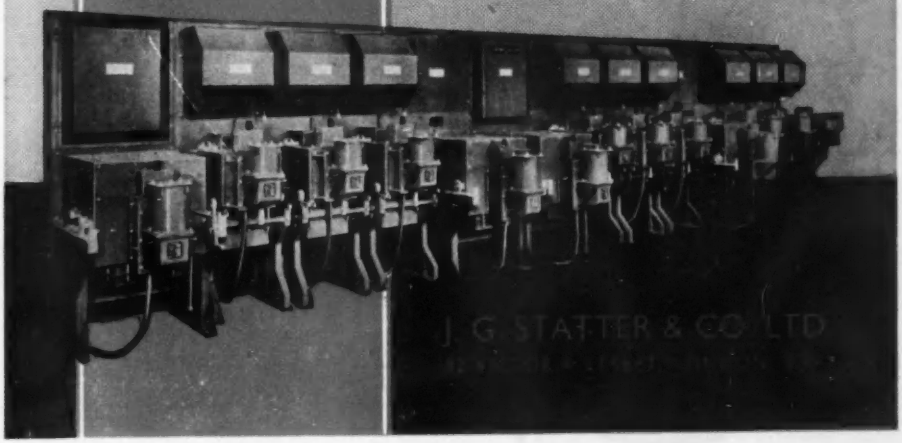

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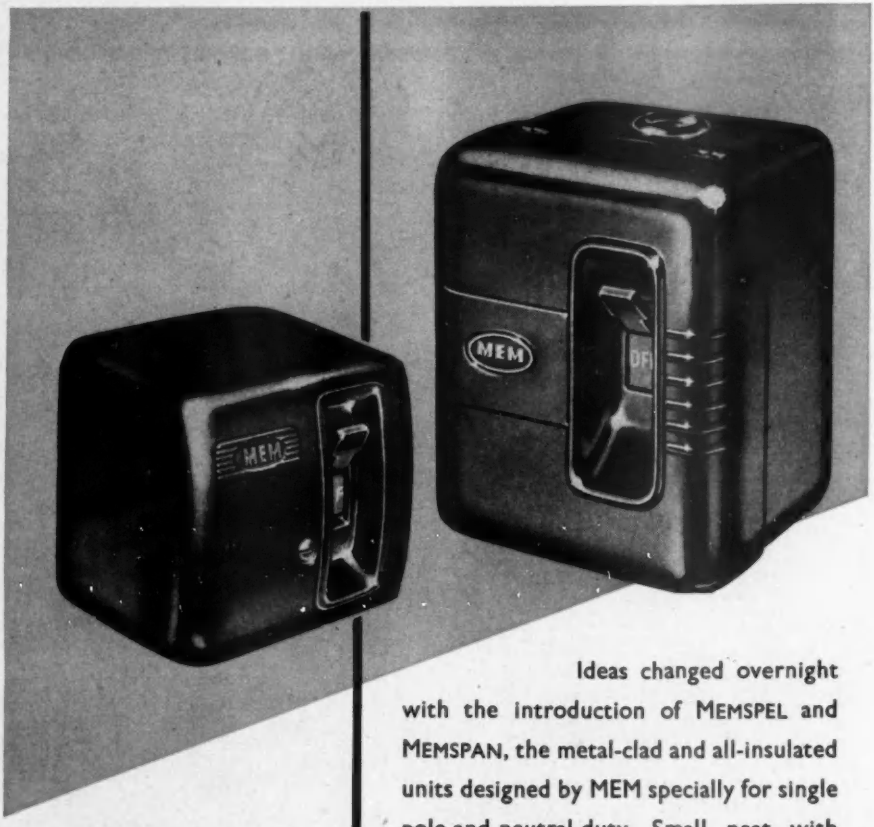


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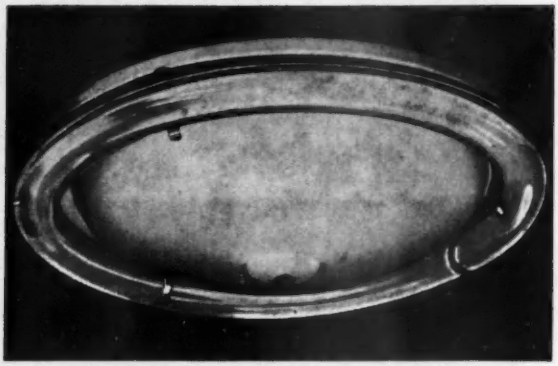

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# ELECTRICAL TIMES

Volume 123 No. 3214 11 JUNE, 1953

PUBLISHED EVERY THURSDAY



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*Editor and Managing Director:*
ROY BALDWIN
M.I.E.E., Barrister-at-Law

*Assistant Editors:*
J. K. JOHNSON
B.Sc. (Eng.), A.M.I.E.E.

K. C. POUNDS
B.Sc. (Eng.), A.M.I.E.E., A.C.G.I.



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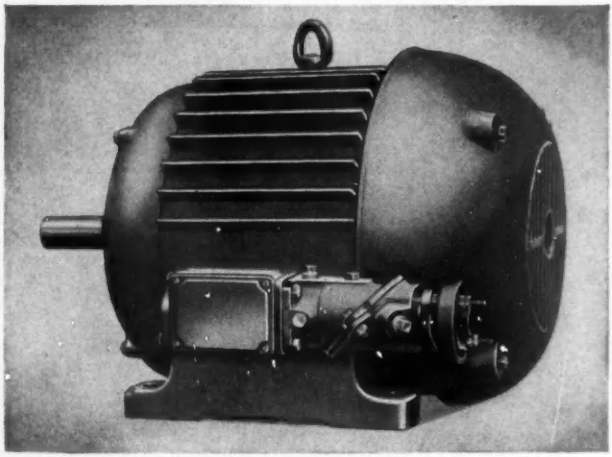

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# Editorial

## *CONVENTION PURPOSE*

AT Bournemouth last year it was generally observed that after some lean years, the British Electrical Power Convention had achieved a new sense of purpose. That promise has now strikingly developed, and the papers presented this week at Torquay reflect in an encouraging way the wholehearted enthusiasm for electricity which carried the industry forward during its early days. The widespread conviction that electricity supply has a proud part to play in extricating our country from its present economic plight lends a sense of urgency to the arguments advanced in the Convention papers, and forces its way through closely argued technicalities in a ferment of added meaning. Especially appropriate in these new circumstances is the consciousness of the overriding importance of costs, exhibited in almost every paper. Conclusions backed time and again by calculations in terms of stated prices and tables of comparisons abound. Such a practical emphasis on economics is only too rare in technical papers, though it is, of course, the very stuff of engineering: possibly its appearance at this Convention is the result of joining together supply engineers, consultants and manufacturers as authors. Whatever the reason, the result is welcome, for it provides the final polish on an unusually useful set of papers which should serve many outside the narrowly technical field.

## *ALL-ELECTRIC FUTURE*

DESPITE this concern with money, however, the great importance of coal conservation was in no way neglected. Electrical engineers have become familiar with this companion problem of national well-being, and after their early setbacks, they are well satisfied with the showing electricity can make on this basis for any application. It was appropriate that Sir John Hacking, in his Presidential Address to the Convention, should take up this subject on which he spoke to such effect just over a year ago, and it brought a sharp reminder of how the position of electricity has improved in the public eye since his Institute of Fuel speech. Yet though he showed a keen appreciation of the present problems of coal supply, and a lively concern for short-term possibilities of keeping down consumption, it was noticeable that Sir John's confidence in the future has its real basis in his expectation of the development of nuclear energy sources. Other solutions are merely stop-gaps, their successful accomplishment being of crucial importance only because we must keep industry turning over at a necessarily high level until, in some relatively few decades, nuclear power stations based first on natural uranium and then on breeder reactors are firmly established. Then the electrical age will be doubly supreme, a fact that it behoves those who plan for the far future to remember explicitly.

## *CAPITAL ECONOMISTS*

WHILE nationalised councils are commonly regarded as fair game for all critics, with time there is emerging a pattern of criticism determined by the direction from which it comes. Thus the high level of B.E.A. capital expenditure is the familiar theme of economists, who are never tired of pointing to the £140 million per annum they are spending in a capital-restricted economy. The clear answer of the B.E.A. that they have a statutory obligation to meet the rising demand for electricity may be correct politically, but it is one that is hardly likely to satisfy the economist, who is not concerned with such legal factors. The only satisfactory answer must be made on the basis of economics. The need for rural electrification and for greater electric power in industry is accepted without

demur; it is against domestic usage that the economist's gaze is turned. Fortunately, evidence on this point is ready to hand in the study made by the Ridley Committee of overall capital costs, including installation as well as production figures. This is the only correct basis, and far from demanding excessive capital for domestic usage, electricity is shown to have the lowest annual capital charges, while solid fuel is the most extravagant in capital. Yet we have never heard economists condemning the adoption of solid fuel on the grounds of high capital expenditure, although it must be running at over £35 million per annum for so-called improved domestic fires alone. If the critics of the supply industry are frightened by the large global sums of expenditure on electrical plant, they must be forced to examine the case in proper perspective. Then it will be seen that from the standpoint of capital expenditure, as well as from other angles, electricity should be the preferred fuel.

## *SAG IN CABLES*

THE summer of 1953 is unlikely to be a time that cable makers will remember with much pleasure. More than most engineering manufacturers, they are sensitive to variations in price of their raw materials, and in present circumstances this tenderness is providing a serious difficulty. The buyers' market characteristic of commerce in general is being intensified in the cable world by the understandable desire of prospective customers to run down stocks which were accumulated, a year or two ago, in anxiety buying when prices were rising, materials were scarce and supplies uncertain. Piled upon these factors is the major uncertainty of a free market in copper which is promised in August, and which may have a significant effect on the price of that important cable metal. The unhappy result is reflected in meagre order books and revealed through the speeches of company chairmen at annual meetings, which have time and again stressed the effect of the prevailing lack of confidence in the future: the industry is weathering an unpleasant time with buyers holding off to await events. Yet there is reason to suppose that this is a temporary phase, and that the factors causing it are steps on the way to a more healthy and regular situation in which the industry will again achieve its accustomed prosperity. For the present, there is at least the satisfaction that reasonable deliveries can again be offered.

## *DOMESTIC ADVANCE*

THERE have been signs in recent months that across the Atlantic there is amongst electricity supply authorities a growing interest in promoting domestic demand. As in Britain, improvement of system load factor provides a powerful incentive, and some American companies are embarking on selective sales promotion in the appliance field to secure this to the best effect. Hopes are evidently running high, for a recent survey conducted by the *Electrical World* over a wide cross-section of the industry indicated that there is confident expectation of a rise from the 1952 average of 2,175 kWh/year/domestic consumer up to 3,800 kWh/year by 1960: an increase equivalent to about 7% per year. Extended use is expected to be made of a number of appliances, covering the range from luxury to necessity, and in many cases the degree of saturation is expected to be more than doubled. No doubt, these predictions will be fully realised only if American prosperity continues unchecked, but they have a solid basis of probability in the price advantages that electricity offers over other fuels. They certainly emphasise that in this country we are very far from domestic saturation. In 1951-52 the average consumption of domestic consumers on the B.E.A. system was 1,340 kWh/year, though in some areas the American average was closely approached. A continued rise of 7% in domestic consumption in this country will bring the average to only 2,300 kWh/year by 1960. Evidently it is not only the industrial consumer who has a long way to go to reach American standards.

Meteor

# *Largest Station in North Island's Waikato River Chain*

By P. W. BLAKELEY, A.M.I.E.E., A.M.N.Z.I.E.

LAKE TAUPO, 238 square miles in area and at an altitude of nearly 1,200 feet in the centre of the North Island of New Zealand, is drained to the sea by the Waikato River. It is planned to harness these waters with a chain of ten stations and the largest station in the chain will be Maraetai, with a capacity, when completed, of 180 MW. There will be five machines. Maraetai, which uses 200 feet of the fall of the river, made its first contribution of power to the North Island grid on October 30, 1952. This was a modest start with a mere 11 MW from one machine operating at half head and was increased within the next two weeks to 33 MW, as the second and third machines came into service, also at half head. Early in April the head was brought up to 175 ft, increasing the output to 95 MW. After the completion of further civil engineering work the lake will be allowed to reach its final level, giving a rated output from the three machines of 108 MW. The fourth and fifth will be completed in 1954.

The dam, powerhouse, spillway and similar works were constructed by the New Zealand Ministry of Works, and all generating equipment, switchgear, etc., was installed by the State Hydro-electric Department.

From the view of the station and dam in Fig. 1 it will be seen that the river flowed in a deep and narrow gorge at this point. Indeed, so narrow is the gorge that the station occupies its full width, leaving no room for diversion or spillway.

The river has therefore been diverted through a 1,688 ft long, 25 ft diameter concrete-lined tunnel by-passing the dam site as shown in the plan of the whole scheme (Fig. 5). The spillway is connected to the diversion tunnel by a tunnel sloping downwards at an angle of 45° and the upstream portion of the diversion tunnel is now sealed off by a massive concrete plug. While this plug was being constructed the lake was held at half level and the flow of the river was taken partly through the three completed machines and partly through the other two penstocks, which were extended through the powerhouse for the purpose.

## *General Arrangement*

The general arrangement of the dam and powerhouse will be clear from the vertical section, Fig. 4. The dam is of the variable radius arch type, 285 ft high and 50 ft thick at the base. Halfway down the face of the dam are the intake gates, each of which weighs 55 tons. They are operated by a hydraulic cylinder. Dam and powerhouse are independent structures, with the 16 ft diameter penstocks spanning the gap between them. In the centre penstock the distance between supports is 120 ft.

*Fig. 1. Dam and power station are seen from downstream in the view at the top of this page*

*Fig. 2. This view of the dam and power house shows the switch structure on the roof, and the penstocks*

The main powerhouse building is 320 ft long by 58 ft wide, and its height is 106 ft from draught tube floor to parapet. It is of steel-frame construction with reinforced concrete panels between the columns and a roof of pre-cast concrete slabs. This form of construction was adopted to give the earliest possible use of the cranes for machine installation. A large workshop equipped with a 50-ton crane runs at right angles off the main building, and the control and administrative block runs almost the full length of the main building on the downstream side.

This is a very brief treatment of the civil engineering features of the scheme, but they will be described in detail in an article in "Civil Engineering and Public Works Review", so readers who wish to discover more about them will have the opportunity to do so.

### *Connections*

The main connections are shown in Fig. 8. Each generator and transformer are switched as a unit on the 220 kV side and thus five circuits connect to a bus on the powerhouse roof. Both ends of the bus are taken to a structure on the left bank to form a ring, and two outgoing lines leave this structure for Whakamaru, which will be the distributing point for all power generated by eight of the ten stations on the Waikato River. From Whakamaru there is transmission north to Auckland and south to Palmerston North and Wellington. There is provision on the Maraetai structure for a circuit from the future Waipapa station farther down the river.

Auxiliary power is available from three sources—from two auxiliary generating sets of 600 kW each and from a 750 kVA local service transformer receiving power over a 50 kV line from the Arapuni station. All three sources feed into a switchboard of 400 V duplicate busbar switchgear. This has one feeder for the essential auxiliaries of each of the five main units, and seven feeders for various station services.

### *Main Turbines*

There will be five turbines of the vertical Francis type, with a rated output of 50,000 horsepower each. They are designed for a net head of 195 ft, and a speed of 166·7 r.p.m. They have welded steel spiral casings capable of withstanding the pressure without any assistance from the surrounding concrete. After welding, each casing was tested to 180 lb/sq in., which is one and a half times the maximum pressure when full load is dropped. The 10 ft 8 in. runners are of cast steel and certain parts are protected with stainless steel to reduce pitting due to cavitation.

Each turbine has a water seal using lignum vitae blocks and a guide bearing with duplicate motor-driven oil pumps, the oil being cooled with water drawn from the spiral casing. The governor is capable of keeping speed rise and pressure rise within reasonable limits without the assistance of a relief valve; speed rise on

loss of full load does not exceed 3?%. Governor and pumping set are contained in a cabinet with instruments on the front panel, thus giving the machine floor a clean appearance as will be seen from Fig. 6. Piezometer points are provided in the spiral casing to give a continuous measurement of the water-flow through the turbine.

## Main Generators

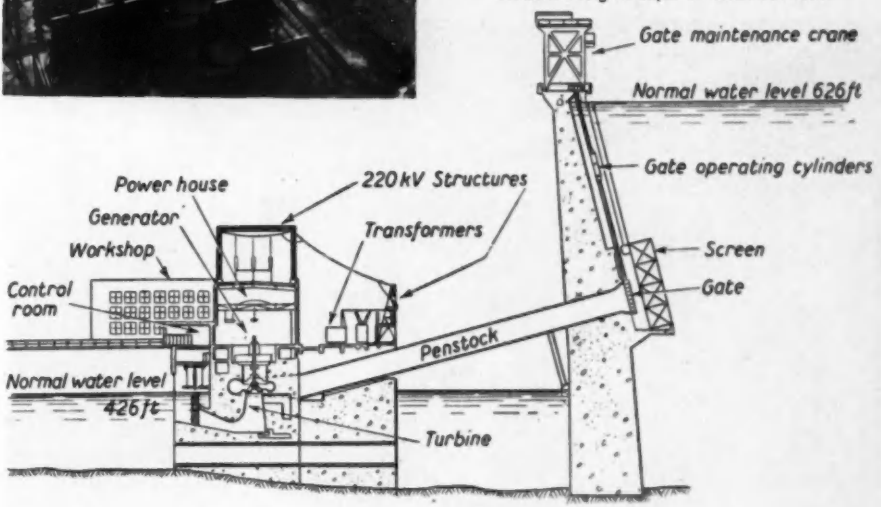
The main generators are 36 pole machines rated at 36 MW at 0·9 p.f. lagging, and they generate at 11 kV. They are also capable, under line charging conditions, of delivering 30 MVA at 10·5 kV and approximately zero leading power factor. Transient reactance is 30%; synchronous reactance 108%.

There are upper guide, thrust and lower guide bearings, all of the self-contained type with cooling coils immersed in their oil-pots. The thrust bearing is of the spring-supported flexible plate type designed for a load of 237 tons.

Windings in the generator and exciters have Class B insulation throughout and are specified to have a maximum temperature rise of 60° C measured by the resistance method or by embedded detectors. In the alternator embedded detectors of the resistance type (10 ohms at 25° C) are provided for the measurement of stator copper and iron temperatures. The stator winding consists of four circuits in parallel. The ventilating system is of the closed circuit type and $CO_2$ fire protection is provided.

Each generator has its own direct-coupled main exciter and pilot exciter, and also a permanent magnet generator for governor drive, and an overspeed device. Main exciters are rated at 165 kW, 250 V nominal at 660 amp full load, while the pilot exciters are 32 amp 8 kW machines.

*Fig. 3. Left shows the transformer station and 220 kV structure on the power house roof. Below, Fig. 4, is a vertical section through the dam and station. Heights refer to mean sea level*



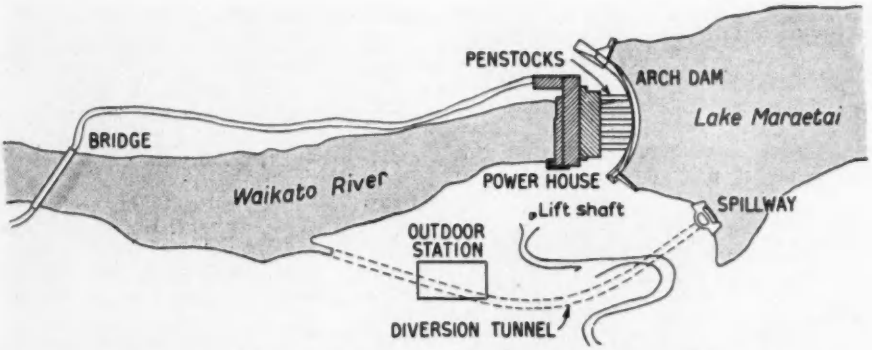



*Fig. 5. Plan view of the Maraetai installation, showing the route of the diversion tunnel*

The auxiliary generator for the governor drive has a rated output of 1·2 kVA at 0·25 p.f. It is designed for full load current of 3·15 amp at 220 V.

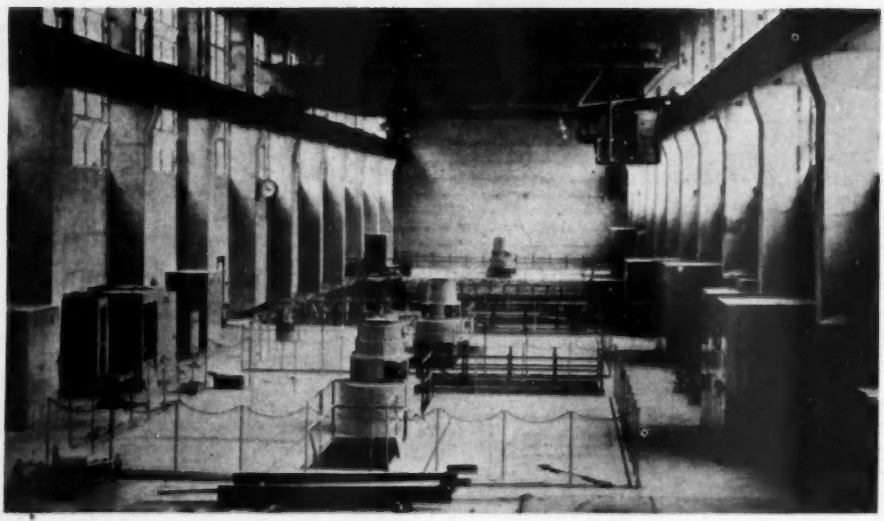
The transformer bank for each unit consists of three 13⅓ MVA single-phase units and the arrangements of the transformers on a platform between the powerhouse and dam is seen in Fig. 3. Each bank is connected delta/star. Concrete walls between transformers give physical separation and serve as support for the 11 kV cables and cable boxes. Open bushings facilitate the removal of a faulty transformer and substitution of the spare. Easy changing of transformers is provided for by flanged wheel undercarriages of 4 ft 8½ in. gauge and a traverser track and truck for handling them into the building or between pads.

Among the fittings are a gas-detector relay and an off-load tapping switch operated from ground level. The impedance of a bank at 75° C is 8·7%.

## 220kV Switchgear

Because of the deep and narrow gorge, the accommodation of the 220 kV switchgear and the leading away of the circuits presented a difficult problem. This was solved by locating

*Fig. 6. A view inside the power station showing three completed machines and space for future sets*



the equipment in three different places—the machine oil circuit-breakers and isolators on the same platform as the transformers (Fig. 3), the busbars, bus-section switches and lightning arresters on the powerhouse roof (Figs. 2 and 3) and the line switchgear in an outdoor station on the left bank (Fig. 9).

### *Busbars*

The high level strain busbars are of 37/·144 —·100 flexible hollow copper conductor insulated with 16 standard 10 in. diameter porcelain discs at 5½ in. spacing and supported from galvanised steel lattice structures. The low level busbars are of 3 in. diameter copper tube supported on insulator stacks consisting of six 14½ in. units.

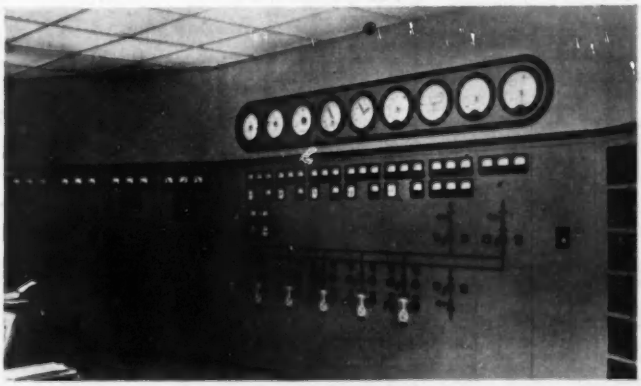
The oil circuit-breakers are of the oil tank type with de-ion grid contacts and are solenoid-operated. All o.c.b.'s are fitted with bushing type current transformers, those on the machine o.c.b.'s being special ratio for differential protection and those on the line o.c.b.'s being multi-ratio for line protection and current indication. On the line o.c.b.'s there are also bushing potential devices which give a potential supply for synchronising and instruments from tappings on the condenser bushings. Normal current is 800 A and breaking capacity 2,500 MVA. Arc extinction is secured in five cycles from the tripping impulse. Complete with oil, one three-phase unit weighs 50 tons.

Airbreak switches are three-pole hand-operated with vertical break blades which have a rotary motion after closing to produce the contact pressure. Those on the lines also have earthing blades.

At each end of the busbars on the roof is a three-phase set of lightning arresters and each set is fitted with a surge counter. These arresters are of a particularly compact type, self-supporting on galvanised steel pedestals.

### *Auxiliary Units*

The two auxiliary units have 900 b.h.p., 750 r.p.m. horizontal Francis turbines with cast iron spiral casings and manganese bronze runners. Their governors are belt-driven and are single acting, the guide vanes being opened by oil pressure and closed by a heavy spring.



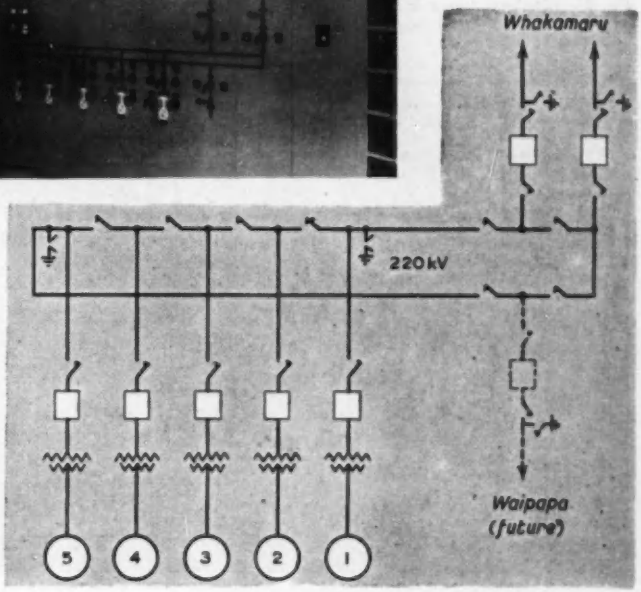



*Fig. 7 above shows the left-hand side of the control room which is described in the text. Fig. 8 right is a schematic diagram of the main circuit connections at Maraetai*

They will close down their turbines in the event of failure of oil pressure or breakage of the belt. The generators, of 600 kW, 400 V rating, are of the open pedestal type with salient pole revolving field, and have direct coupled exciters. Turbine and generator bearings are fitted with dial type thermometers and alarm contacts.

## *Control and Metering*

Fig. 7 shows the arrangements of panels on one side of the control room. The board on the left is the voltage regulator board for the main units and was supplied under the generator contract. The regulators are of the normally inactive type and control exciter field rheostats connected in the form of a Wheatstone bridge to give good control of excitation under line charging conditions. There is also provision for tripping and reclosing the alternator field circuit-breakers to prevent excessive voltage on loss of load.

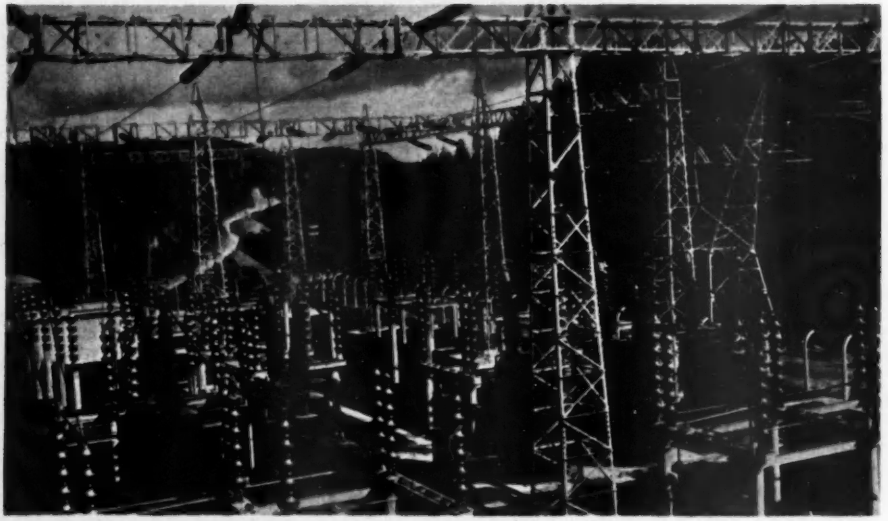
In the centre is the main control board with a mimic diagram of the main connections, and above it are the main operating instruments for the station. The next board accommodates miscellaneous equipment, including alarms, load-frequency control, recorders for frequency, generator temperatures, station output, and water levels. There are also a quick-trip graphic voltmeter and ammeter for recording faults, and watt-hour meters with a five-point summator and printometer. The load-frequency control equipment provides for the station running on a fixed load or in control of system frequency. In the first case it will hold the output of each machine to a pre-determined value. In the second case it will vary the output of all machines simultaneously to maintain correct system frequency. The controlled frequency can either be set with a dial or automatically corrected for time error.

The generator temperature recorder gives a simultaneous record of temperatures in the five generators and selector switches allow any one of the ten detectors in each generator to operate the recorder. The quick-trip graphic instruments have a normal chart speed of $\frac{3}{4}$ in. per hour, but when a fault occurs they run off 18 in. of chart in 24 seconds, thus giving a record of 220 kV voltage and 220 kV neutral current during and immediately after the fault for use in analysing relay operations.

TABLE 1. ALARM INITIATION DEVICES

| |
|---|
| Overspeed device. |
| Governor oil pressure switch. |
| Turbine oil pump change-over relay. |
| Voltage regulator cut-out switch. |
| Generator air circuit thermometers. |
| $CO_2$ equipment. |
| Bearing thermometers. |
| Screen blockage relay. |
| Headgate auxiliary switch. |
| Transformer water flow relays. |
| Transformer thermometers. |
| Transformer gas detection relay and oil level device. |

*Fig. 9. Line switchgear is seen here in the outside switching station, which is situated on the left bank of the river at a considerable height above the dam*



On the right is the control board for the auxiliary units and 400 V switchgear with a mimic diagram of this equipment.

Control room lighting is provided by 25 double 40-watt fluorescent fittings mounted above a Perspex ceiling. This gives an average illumination of about 30 foot-candles with a complete absence of shadows.

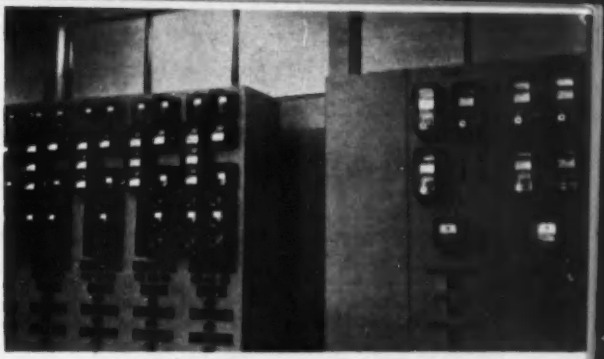


*Fig. 10 shows some of the relay panels*

## *Alarms and Protection*

The alarm panel next to the main control board contains six groups of alarm indicating units, one for each of the five main machines and a miscellaneous group. The devices which initiate alarms in connection with the main machine are set out in Table 1. These alarm indicating units are of a type developed by the department. On the occurrence of a fault a light comes up and the alarm bell rings. The bell can be silenced by a button on the indicating unit concerned but this does not prevent it ringing again for an alarm originated by any other unit. When the fault is removed the system is self-resetting.

Fig. 10 shows the relay room, adjacent to the control room. The relays provided for a main generating unit are summarised in Table 2, which also notes the type of protection provided.

All the relays trip the 220 kV oil circuit-breaker and the generator field circuit-breaker. The generator differential relay also energises the $CO_2$ equipment and trips the governor emergency solenoid.

The two transmission lines, which are only six miles long, are protected with Translay pilot wire relays. These are backed up with directional overcurrent and earth fault relays.

Table 2. Relays Associated with a Main Generating Unit

| Duty | Type and Operation |
|---|---|
| Overcurrent | An induction disc relay rated at 5A with a current setting range of 50-200%. It has an inverse time characteristic with a time multiplier range of 0·05 to 1. |
| Over-voltage | An induction disc relay rated at 110 V with a voltage setting range of 100-140%. It has an inverse time characteristic with a time multiplier range of 0·1 to 1. |
| Earth fault | An attracted armature relay rated at 110 V with a fixed voltage setting of 10 V. It has an instantaneous time characteristic. This relay is energised from the secondary side of a neutral earthing transformer with a ratio of 6,350/140 V. |
| Generator differential | An induction disc relay rated at 5A with an operating current setting range of 5-10% and a fixed bias setting of 10%. It has an inverse time characteristic which is not adjustable. This relay gives split phase as well as normal differential protection of the generator by connecting to current transformers which carry the whole generator current on one side and half the generator current on the other side. Thus any fault which disturbs the balance of current between the two halves of the winding will operate the relay. |
| Generator and transformer differential relay | An induction disc relay rated at 1A with an operating current setting range of 50-100% and a bias setting range of 5-40%. It has an inverse time characteristic which is not adjustable. This relay is intended primarily for transformer protection but it is more convenient to connect it to cover both generator and transformer, and this arrangement also gives the slight advantage of backing-up the generator protection. |
| Transformer gas pressure | A variation of the familiar Buchholz relay. Instead of connecting in the pipe between main tank and conservator it is mounted directly on the main tank. It has one pair of alarm contacts which close on accumulation of gas and one pair of trip contacts which close on sudden increase of pressure in the tank. |

The Maraetai station has proved a very welcome addition to the North Island power system. In common with most countries, New Zealand has had its problems of power shortage, and power restrictions in varying degree have been in operation in the North Island since 1941.

On February 17 the Minister in charge of the State Hydro-electric Department was able to announce that "because of improvement in water storage and the operating of the new generating station at Maraetai power allocations in the North Island will be suspended from April 1 until further notice."

CONTRACTORS

| | |
|---|---|
| Main turbines | Allis-Chalmers Mfg. Co. |
| Main generators, inc. exciters | Canadian General Electric. |
| Main transformers | Canadian General Electric. |
| Aux. turbines | Boving and Co. |
| Aux. generators, inc. exciters | Lancashire Dynamo and Crypto Ltd. |
| 220 kV swgr. structures | A.C.-Elec. Pty. (Australia) and Steel Fabricators and Galvanisers Ltd. (N.Z.). |
| 220 kV o.c.b.s. | Westinghouse Electric Mfg. Co. |
| 220 kV airbreak switches | Eastern Power Devices Ltd. (Canada). |
| Lightning arrestors | A.S.E.A. (Sweden). |
| 400 V swgr. | Statter and Co., Ltd. |
| Voltage regulation | Canadian General Electric. |
| Control boards | G.E.C. with Everett Edgcumbe, Nalder Bros., Elliott Bros., Ferranti, Leeds and Northrup (U.S.A.) and Esterline-Argus Co. (U.S.A.). |
| Relay boards | Metropolitan-Vickers Electrical Co. |
| Instrument transformers | Metropolitan-Vickers Electrical Co. |
| Cranes | Stothert and Pitt Ltd. and Cowans, Sheldon and Co. |

# NALGO Conference Opens

## *Black-coated Workers Losing Ground*

SPEAKING at the Annual Conference of the National and Local Government Officers Association, at Llandudno on Tuesday, Mr. Watson Strother, President of the Association was mainly concerned with the remuneration of the members of the Association. During the past year, many members had thought that the disappointments outweighed the successes. The Industrial Disputes Tribunal, which had adjudicated on the salary increase claim put forward last year had not given the 10% which was thought to be fully justified, and had also rejected the claim for a London Weighting allowance. Only £25 per annum had been granted for most officers and less for those in the lower ranges. Since 1946 an increase of only 25% had been made in the maximum salary of the local government General Division, but in the same period prices had gone up by 40%.

The stability of prices existing today meant that there was little prospect of succeeding on another claim for a general salary increase. Any claim must therefore be based, not on the cost of living but on the market value of the service provided by the NALGO members to the community. This, he claimed, was not small. Who designed and managed the million homes built by local authorities? Who planned and maintained most of the 185,000 miles of road? Who administered schools, hospitals, and saw that gas, electricity and water were supplied to homes and factories? Members of NALGO. Of a total national expenditure of some £20,000m. no less than £2,500m. passed through the hands of NALGO, so that less than one two-hundredth of the population was responsible for the efficient management of one-eighth of the nation's economy. Out of that £2,500m. only 3½% went in wages and salaries, and many members received less than the average weekly pay of £7 12s. for manual workers.

The efficiency of the public services had to be preserved. They were an essential part of the national structure and a breakdown could not be permitted. Salary scales should therefore be made more flexible and promotion into higher grades speeded up so that the good man came quickly to the top. It was important to recover the lost ground, not by a general uplifting but by restoring differentials and incentives and by so easing the path to the top that the services represented would gain in attractiveness, efficiency and general productivity.

Despite the wage setbacks, the Association had had some outstanding successes. A number of local authorities had been compelled to apply the recommendations of the Joint Negotiating Committee for Chief Officers, but it was still important to ensure that posts advertised at lower than the negotiated salary should not be filled.

During two years membership had increased by more than 25,000 and was now about 220,000 members.

# Our readers' views ...

## Small Portable Electric Tools

SURELY Mr. D. Kingsbury (*Our Readers' Views*, June 4) is being somewhat illogical in suggesting that restrictive legislation should be introduced on the strength of an individual experience with a particular tool. The coincidence of three faults in a short time—and two of them apparently simultaneously—is to say the least of it most exceptional, and this, taken in conjunction with a wiring-up error, must be well-nigh unique.

If Mr. Kingsbury is of the opinion that his drill could not stand up to 240 volts a.c. indefinitely, I feel that he must possess a particularly poor specimen, or alternatively it has been badly maltreated. The switch in the neutral is a wiring error which could occur on any appliance, and I fear does occur on some 50% of switched vacuum cleaners using two-pin plugs—and there must be some thousands of these in use today.

The attack, I feel, in this case should be on the manufacturer for bad workmanship, not on the poor user who might be deprived of a useful and labour-saving tool. The attitude of mind that all ills can be cured by restrictive legislation is all too prevalent today.

*"Handyman"*

ROMFORD

WHY does Mr. D. Kingsbury, whose letter appears in your issue dated June 4, confine his proposed legislation to the use of portable tools? Surely all electrical apparatus operated at lethal voltages is potentially dangerous. Accidents occur even in industry where equipment is subject to statutory regulations and its maintenance the responsibility generally of competent persons.

By far the wiser and cheaper alternative to legislation and all that that entails, would be the conversion of domestic supplies to 110 volts. Such schemes might be financed, for example, by appropriate increases in local government taxation under the heading of "Public Safety."

The adoption of 100/110 volts would benefit manufacturers, in that appliances produced for home consumption would also suit extensive overseas markets.

*"A.M.I.E.E."*

CHESHIRE

## Pit Electrification

IN the National Coal Board's Report in 1952 details are given, on page 23, that between 1947 and 1951, twenty-five electric winders were installed and nineteen steam winders were converted to electric drive. In 1952, a further twenty-six electric winders were installed and six steam-driven engines were converted to electric drive. This rate of conversion from steam to electric drive would appear to be lamentably slow.

The British Electrical Development Association published a Report on "Electrification of Collieries," as long ago as July 1947, which stressed the large savings of coal that would result from the replacement of the many old and inefficient steam engines by electric drives.

In view of the present fuel situation and all the exhortations for economy in the use of fuel, it is a pity that a more active policy is not adopted by the N.C.B. itself in the electrification of steam drives, which have long since ceased to be used in other industries.

*V. W. Dale*

GENERAL MANAGER AND SECRETARY,
E.D.A., LONDON, W.C.2.

◆ ◆ ◆

## Schrage Motor Characteristics

WITH reference to the letter from Mr. W. K. M. Wood in the issue of May 7 in connection with my article on the Schrage motor which appeared on April 16, I should like to thank Mr. Wood for his notes in amplification of the remarks on the acceleration of the Schrage motor when operating as an inverted induction motor. My statement on page 712 that the motor torque will fall as acceleration proceeds refers to the conditions past the speed at which the motor develops its maximum torque, i.e. to the stable portion of the speed-torque characteristic as the motor reaches a steady speed.

I must apologise for a slight error on page 714 in which I remarked that below synchronous speed the rotating flux revolves in space in the same direction as the rotor. This should read "Below synchronous speed the rotating flux revolves in space in the opposite direction to the rotor" as, in fact, was correctly shown in Figs. 2c and 2d to which this sentence referred.

*J. L. Watts*

SOUTHAMPTON A.M.I.E.E.

# *It is time that the Farmer Knew the Facts!*

## Dissatisfaction with rural and farm electrification costs can come from a basic misunderstanding

FARMERS often think electrification costs them too much. In letters to daily papers and to the farming Press, resolutions at conferences, and speeches in local councils, they repeatedly express a marked sense of grievance. They feel that there is too little electrification at too great a cost, and they have an uncomfortable conviction that somehow in the complicated business of administering and engineering electricity supply, they are being victimised.

In the past progress may have been slow—and for good reason—but in fact there has been a remarkable speeding up in rural electrification since nationalisation.

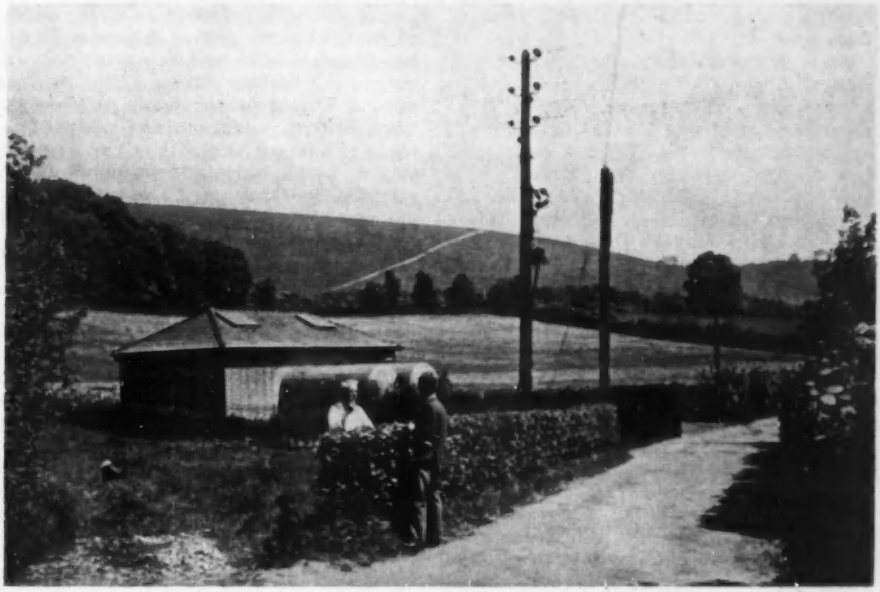
The supply industry also has an answer to criticism levelled at charges and terms for supplies. It can show beyond doubt that it is not only doing a worth-while job in taking the benefits of electricity out into the countryside, but that it is also bearing the lion's share of the expense of this costly business. Why, then, is the farmer so obviously dissatisfied and suspicious? Why do his feelings on the matter extend so patently beyond mere impatience with the rate of progress? How much is due to an ingrained dislike of all expenditure whatever the advantages it brings?

*A low tension line in the West Midlands*

### *Is He Told?*

It is possible that the answer lies in the failure of those whose job it is, and others who have a responsibility to guide the farmers, to tell them the facts in a form that they can appreciate. While it may be easy to answer the countryman's first suspicions with the arguments that fully satisfy the engineer and administrator, it is another matter to convince the farmer in terms he understands and give reasons that fit in with his own experience and his outlook on life. The industry and its representatives must pay attention to this vital difference in approach, for the price of neglecting it can be a failure to capture the sympathy and co-operation of the farmer as a consumer.

To understand why a special technique is required, it is necessary to consider the recent history of agriculture in this country. The depressed state of the industry before the war had left a strain of bitterness in farmers of those days. In the pre-war years, capital was insufficient to secure economical working, and competition from foodstuffs from overseas was fierce, and in the eyes of many unfair. Remembering how quickly conditions deteriorated after the 1914/18 war the working farmer today requires to be convinced that any venture into which he is asked to put the money he now has, is quite sound. He is inherently suspicious of the modern improvement in some new technique which is enthusiastically advocated by some "stranger from the town." It is disastrously easy for electrification, if not properly presented, to suffer in



this way. On the other hand, although he is conservative in his methods, and perhaps inclined to think he has a hard-earned right to special consideration in the national scheme of things, the farmer is at heart a realist and in outlook a sound business man. If he is convinced on two points he will be understanding, if not necessarily enthusiastic at first. The two criteria are, that he is being fairly treated in terms of the price charged for some product or service; and that the investment entailed—his or someone else's—is worthwhile and justifiable.

For complete success, therefore, the supply industry must find means to prove to the farmer the advantages of a public supply and show that electricity boards get no more, and often far less, than a reasonable business return for their trouble.

### *Twenty per cent*

"Twenty per cent," says the farmer; "I would like to get 20 per cent on my money." Here is the first misunderstanding which the boards must be at pains to resolve. It is quite true that few boards can undertake rural electrification at a yearly revenue below 20% of their capital expenditure, though some in the more prosperous areas can make do with 15% at present in the hope of brighter prospects in the future. Whatever is hidden in the simple convenient and traditional expression "20% return" must be made apparent to the farmer. Those who have had an opportunity of bringing this to the farmer's attention aver that once he has been satisfied that the terms are fair and can be justified, the farmer is usually willing to negotiate. He even becomes keen if he realises that he may be "getting something for nothing" which is often the case.

A typical farm supply, involving a short h.t. extension, a step-down transformer, and a l.v. line to the farm may cost the board £300. On the 20% basis, the electricity board concerned looks to receive £60 every year from the farmer in payment, for (and this is the important point) electricity supplied. What happens to this £60 in the board's books?

With prevailing rates of capital charge and of depreciation write-off, about £30 disappears at once, merely to maintain the supply in being. The revenue of £60 implies the consumption of a quantity of electricity which at the best on average costs a board about £40 to purchase from the B.E.A. The table expands this story.

So in terms of cold figures, the seemingly severe demand of "a 20% return on our money" proves to be an acceptance of a probable loss of £10 per year. This is not pure philanthropy, of course—there is behind it the expectation and hope of better things: a smaller loss, but

rarely a profit, to come—but it is far removed from extortion!

Such an explanation can lay the bogy that electricity boards are expecting the farmer to provide their working capital. Time and time again, the farmer who is asked to contribute, say, £100 towards the £300 cost of bringing him a supply, feels aggrieved. Yet even if he paid the whole £300, the board would still hardly make a profit, for the yearly saving involved would only be the interest on the capital amounting effectively to about £12.

## *A Business Man*

If the farmer is given these facts in terms that he can understand, he will really appreciate them. He is a business man, and will not willingly spend £300 on ploughing and seeding a field with barley, if he knows that all he will receive, after harvesting his crop, is £200. Equally, he will not expect another man to do this, nor to face a similar expectation of loss. It is true that the farmer has to take the rough with the smooth, and may gain on one crop only at the expense of a loss on another. The answer to this comparison, however, is that the boards are already carrying a corresponding risk, for to a large extent the smaller consumers in one class are almost certainly having to be assisted by larger consumers in another class. In this concept the farming consumer is doing very well.

So much for the first of our two criteria. The farmer is not being offered an unreasonable deal. Now, what can he expect in return for the investment he must make? There is a brief answer: electrification assists the farmer to attract the right kind of labour; releases skilled labour for important field tasks; provides the conditions and equipment that will help to save money by discarding of old-fashioned methods and to make money by facilitating qualification for higher milk prices.

This last factor offers the prospect of an immediate monetary return to offset the cost of electrifying the dairy. A change from a non-designated milk to T.T. attested may well mean, to a farmer milking 25/30 cows, an extra £150 odd on the yearly milk cheque. Good lighting, ventilation and modern technique with power for machines, and a copious supply of hot water and steam all readily provided by electricity are among the conditions under which licences for quality milk production are granted.

Dairy farms are, of course, a particularly apt subject for electrification sales talk, but there are some advantages for every type of farmer. Yard lighting is a universal boon, though it could usually be carried out to a better standard than is common today, and other farmers besides the dairy specialist can benefit in terms of cash saved by operating a small low h.p. hammer mill. Arable farms have a materials handling job to perform which electrification can greatly ease, while striking gains are possible with the latest methods of crop drying, in which electrically powered plant plays a prominent part. Finally comes the farm given over to rearing livestock. Usually this is remote from towns and villages, and the amenities which electricity can bring are necessary factors in attracting and holding the labour necessary for such farming.

## *Tax Relief*

In this way may the farmers' complaints be answered. Yet the story must not be allowed to stop there. Some corners remain unnecessarily sharp, and merit the rounding-off that further attention can give—capital contributions and line rental schemes, for example. These are not entirely "lost" to the farmer. Expenditure on electrification is usually subject to income tax relief in one way or another, and the salesman should make it his job to appraise the farmer of the hidden benefits that may accrue from a consideration of this aspect.

ANNUAL REVENUE ACCOUNT FOR FARM SUPPLY

*Capital Cost of Providing Supply*—£300

| Receipts | | Expenditure | |
|---|---|---|---|
| By: | | To: | |
| 20% return on Capital Cost, 1/5th of £300 .. .. .. .. .. | £60 | Purchase of £60 worth of Electricity say .. .. .. .. .. | £40 |
| | | Repairs, Maintenance, Rates, Rents, Insurance, Interest on Capital, Depreciation allowance, Management, say, 10% on capital cost 1/10th of £300 .. | £30 |
| Annual Loss .. .. .. .. | £10 | | |
| | £70 | | £70 |

A line rental is a direct working expense on the farm and therefore is subject to tax relief through the farm accounts. The same applies in the case of payments made under guaranteed minimum consumption agreements. Capital contributions and expenditure on electrical equipment (including farm wiring) also attract a fair measure of relief from income tax.

The farmers may also have some questions to ask about private generating plant. From the electricity board saleman's viewpoint, he must be convinced that although private generating plant has many uses on the farm, particularly as a stop-gap measure pending the availability of a public supply, it can never be a complete substitute. In general, it is idle for the farmer to believe that because he is producing his own electricity, it is less costly than energy from the public supply. Here again, facts and figures are required if the point is to be carried.

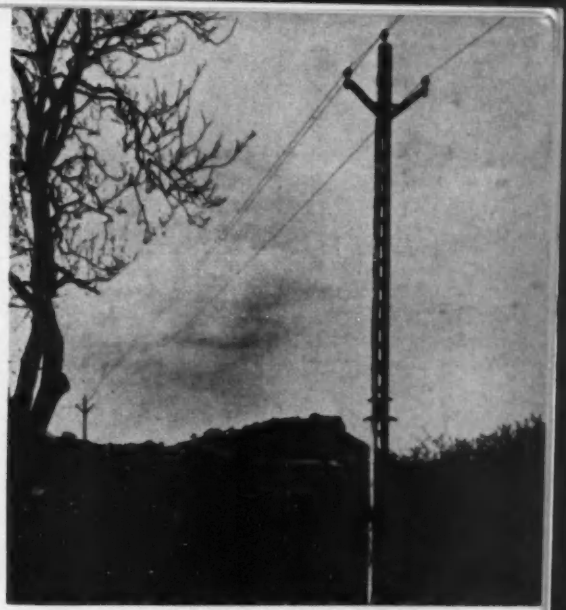
### Hidden Costs

If the farmer with a private plant does record the units generated, the bare cost per unit of diesel and lubricating oil consumed may make it appear that his generating costs are very low. To get a true appreciation, however, it is necessary to take into account other factors such as interest on borrowed capital, depreciation of the plant and cost of repairs and labour. On most farms the time spent by staff in attending to the generator could be more profitably employed elsewhere.

The question of actual cost of electricity generated privately per unit is debatable—some farmers claim very low figures. Surely if the farmer takes into account all the factors previously mentioned he cannot generate more economically than a public supply. One area board carried out a test on a small diesel-alternator; taking into account interest, depreciation, etc., in addition to fuel cost the running rate worked out at about 3d. per unit. Another farmer recently gave details of his electricity accounts before and after taking a public supply. With the public supply, electricity cost him only 36% of the figure for private generation.

### Spreading the Facts

There remains one question: "Who is to explain all this to the farmer?" The area boards must, of course, have their agricultural experts, and the main burden will fall on these. They must work to gain the confidence of the farming community in their own locality, and to this end they should build up close co-operative relationship with the local agricultural associations to whom the farmer has been accustomed to turn for guidance. Electricity authorities must provide an efficient after-sales service organisation equivalent to that offered by the local agricultural engineer and merchant. The board's local service centres must be geared to support the efforts of the sales staff with alert response at all hours to the farmer's call for assistance.



*Beeston Castle is seen in this picture showing concrete poles carrying sca h.t. conductors*

### Full Briefing

The board's staff engaged in this work should be fully briefed on the essentials both of rural electrification economics and of the technicalities of electrified farming. Given this general understanding of the problem with which they have to deal, they should not find the farmer the particularly "difficult" potential customer he is often considered.

However, no matter how capable the board's representatives and the co-operating agricultural engineers prove to be, the confidence of the farmer will take a long time to build up. Even when he has ceased to distrust the salesman actively, the farmer will not lose sight of the fact that such men have a vested interest in enthusing over their wares. He finds it easier to believe his own kind.

This again is where the agricultural associations come into the picture. Through National Farmers Union and Young Farmers Club, the man who has had satisfactory experience of electrical farming can sell electrification to his fellows. Much can be done to enlist the assistance of such organisations, and that assistance is well worth having.

1953

Sir JOHN HACKING

Presides over the Coronation Year

Electrical Power Convention at Torquay

# PRESIDENTIAL PORTRAIT

THIS year's president of the B.E.P.C., Sir John Hacking, has had a long and distinguished career in the electrical industry. He was born at Burnley, Lancashire, in 1888, and first went to Burnley Grammar School. At the age of seventeen he began his electrical career by serving an apprenticeship with a firm of motor manufacturers in Leeds, where he continued his technical education at the Technical Institute and later at Leeds University. His first experience with the supply industry was gained when in 1908 he joined the Newcastle-upon-Tyne Electric Supply Co. as a junior assistant. Here his duties were connected both with operation and construction.

In 1913, however, he left the supply company to join Merz and McLellan, the consulting engineers, and stayed with them for some twenty years. During this period his experience included work on railway electrification schemes in various parts of the world. He went, for example, to the Argentine as assistant to the firm's representative in 1915 and was at Buenos Aires up to 1923. In the following ten years he held posts in London, South Africa and Bombay. In London, he was chief assistant in the traction department of Merz and McLellan; in South Africa, his concern was principally with the Natal main line railway, and in Bombay he was connected with the electrification of the Great India Peninsular Railway and the Bombay-Baroda Line.

During this period (1929-33) he had the task of supervising the construction of the Grid, in mid-East and North-East England, Merz and McLellan being the consultants for this part of the work, and after a return visit to Bombay in 1933, he became head of the electrical department of the firm at Newcastle.

With such a background it was not remarkable that he should have joined the Central Electricity Board in 1934, in the capacity of deputy chief engineer, and his promotion to chief engineer followed in 1944. That position he held until vesting day (1947), when he transferred to the British Electricity Authority as deputy chairman (operations).

In January, 1947, he presented, in conjunction with Mr. J. D. Peattie, a paper to the I.E.E. on "The British Grid in Wartime." This paper showed how the Central Electricity Board had anticipated, with remarkable accuracy, the course of events.

Acknowledgement of his contribution to electrical engineering came in January, 1949, when he appeared in the New Year's Honours List.

In the past few years he has taken a most active part both socially and technically in the Industry. In April 1949, in company with Mr. F. Shakeshaft and Mr. W. B. Noddings, Sir John left for the United States to investigate American practice with regard to electricity generation and power supplies. He relinquished his position as chairman of the Joint B.E.A./B.E.A.M.A. Committee in March of the same year, and in July was elected vice-president of the I.E.E. In May, 1951, he became president of the Batti-Wallahs' Society, and in June vice-chairman of the B.E.P.C. In the same year, Sir John became President of the Institution of Electrical Engineers, and his inaugural address on the future of power in this country put new heart into the industry.

1953

8-12 JUNE
TORQUAY

# CORONATION CONVENTION

TORQUAY'S Pavilion again houses the British Electrical Power Convention this week, and, appropriately enough, on its return to its first venue, the Convention has a programme once more extended to its rightful length. Further, the Convention Exhibition is back again, grown after its absence of last year, but as well fitted as ever to serve as a meeting-place for delegates and a centre of interest.

There is one difference this year, however—badges and programmes were distributed beforehand, so pressure on the Convention office at the beginning of the week was somewhat reduced. Despite this, registration remained the only "official" activity for many delegates on Monday, though B.E.A. and electricity board representatives had their usual opportunity of attending a private meeting addressed by Lord Citrine.

Although the exhibition was available to delegates all day on Monday, it was not formally opened until the evening, and this ceremony provided Sir John Hacking, president of this fifth British Electrical Power Convention, with his first official duty of the week. The opening, indeed, was made a more formal occasion than in previous years, and attracted many delegates and guests. Amongst those present was the Mayor of Torquay, and members of the Convention Council.

A new feature was the introduction this year of a badge of office for the President of the Convention. Lord Citrine, the first President four years ago invested Sir John Hacking with his badge.

It was on Tuesday morning, however, that the main business of the Convention got under way with a civic welcome accorded by the Mayor and then the presidential address delivered by Sir John Hacking. This is summarised later in this account, as are the other papers which were delivered during the first half of the meeting.

Delegates reassembled on Tuesday afternoon to hear Col. B. H. Leeson deliver a paper on the Convention theme "Electricity and National Prosperity." This provided the broad national background against which specific electrical problems could be considered, first with reference to manufacturing industries and then, in the second half of the week, with attention focused more on agriculture.

Tuesday evening revealed change from some years—the reception at the Town Hall was held jointly by the President and Lady Hacking, and by the Mayor and Mayoress of Torquay. This was, too, the only reception of the week as such, and it was followed by dancing.

Yesterday brought four papers, headed by a valuable general survey by Mr. E. R. Wilkinson—and in the afternoon, a deserved break from meetings for delegates.

## *Presidential Address*

Appropriately enough, Sir John Hacking devoted his presidential address to a consideration of fuel economy from the broadest aspects of electricity supply. Dealing with the country as a whole, he suggested that some 3·5% of fuel went towards producing light, 25-30% for mechanical power and 60-70% for heat. In the lighting field electricity remained supreme, with a story of increasing efficiency. For energy converted into mechanical power, electricity again held the lead from the efficiency angle and, indeed, from all others so far as energy for industry was concerned. This accounted for half the fuel used as "mechanical energy"; the other half went for transport requirements, often at a very low efficiency.

There remained heating in all its forms, including cooking and water-heating, and it was only here that solid fuels, gas and electricity were found to be in strong competition. The competition arose from the common basis, coal, and it was a point to be considered, that the competition would disappear were coal replaced by some abundant new source of energy, such as nuclear fission.

Insulation of buildings could markedly cut down the coal needed for this form of heating, but the cost of insulating materials was such as to give little inducement to this. Electric heating accounted for about one-third of the public consumption of electricity, and if an increasing share of the domestic heating load were not obtained (especially cooking) the system load factor would fall and higher charges result.

Yet this and many other considerations all meant more coal—Sir John estimated that in 50 years' time the requirement will be 300m tons. Whence was this to come? Underground gasification of thin seams might help, by providing a fuel for gas turbines to drive electricity generators, but present indications were that it was unlikely to reach significant proportions. Full development of known hydro-electric resources in Great Britain could give the equivalent of another 3m tons of coal per year, while tidal power, represented by the Severn Barrage, might save another 1m tons per year. On a "very optimistic view," the development of wind power would only save the same amount.

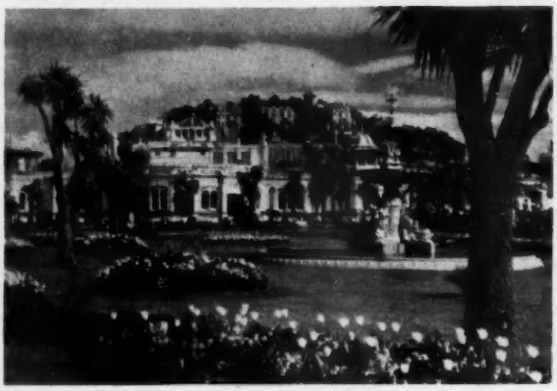
This left nuclear sources of energy, and the stage had been reached, Sir John said, at which the building of one or two experimental plants was well justified. He expected Britain to go ahead in the near future with plans to consume natural uranium on a scale which would make a significant contribution to our electrical energy supplies of fifteen to twenty years hence.

Successful development of nuclear power application, however, depended on the development of breeder reactors, and it might be many years before this could make a significant contribution to our energy supplies. World supplies of uranium, assuming 100% utilisation, were many times greater than known reserves of coal and oil, and thorium, which could be converted into U233, was more plentiful still.

Thus a two-fold task existed : to eke out present resources to provide for the ever-increasing quantities of energy demanded, and at the same time to press ahead with nuclear development at all possible speed. In both directions success depended to a large extent on the amount of capital which was made available. There were three major uncertainties in the general picture: first, everything depended on maintaining competition in the export market so that we could pay for essential imports. Then there was uncertainty as to the effect on the gas industry of the rising price of coal, the shortage of coal suitable for carbonisation or, on the other hand, of the possible total gasification of low-grade coals and of natural gas discoveries. Finally came the uncertainty of the rate at which nuclear power stations were built.

The next 10 to 15 years would see supplies of electricity brought within range of all but a fractional minority of the premises in Great Britain. It was the only one of the three main fuels which could supply certain household services.

*Torquay Pavilion seen from Princess Gardens*



1953

Col. B. H. LEESON

Sets the Convention theme

on Tuesday with his paper on

# *ELECTRICITY and NATIONAL PROSPERITY*

BRITAIN has four basic needs for prosperity: more human effort, greater production of basic commodities, more fuel and power, and more capital. To supply these needs is the task ahead of us in this new Elizabethan Era.

In 1850 only about 6% of the world's work was done by machine, but by the end of the century this proportion had increased to 40%. In producing this progress scientific discovery and invention were matched by the initiative and courage of the business man, by the vision of the educationalists, and by the people's stern sense of reality. The same ingredients are needed today, when the discovery of electricity has preceded our new era just as the discovery of steam preceded the Victorian era.

Today the shortage of coal is without doubt a principal cause of our economic instability, but of no less importance is the decline in the intensity of human effort. Shorter normal hours of work are one sign of this. In the result, Britain has been living on her reserves, helped until recently by Marshall Aid. Now our productive effort must be re-orientated, so that it may dovetail into the demands of the world today. There is no reason, however, why Britain should not win economic recovery and prosperity.

In this work the electricity industry must play a leading part; for industrial productivity is largely dependent on the amount of energy available to work people. Coal supply is falling behind potential demand and attention is necessary to methods of conserving supplies. Here again, electricity can help. As a consequence, the electrical supply industry has a right to demand additional capital for continued development, and the profession of electrical engineering as a whole must undergo expansion to meet the country's needs. Even today, it is interesting to note, people engaged in all branches of electrical engineering, including

*Left: Messrs. W. L. White, H. G. Palfreman, A. S. Oldhams, J. F. Ford and B. MacFarden. Right: Messrs. L. E. Mold, A. T. Crawford, F. A. Hill, J. Bennett and F. N. Beaumont*

*This air view of Torquay shows many of the centres*

telecommunications, total nearly 950,000. In the electrical power industry their number has been increasing by 50,000 every year.

The effect of electricity on productivity can be stated succinctly thus: the placing of 1 kW of electrical energy in the hands of an average man increases his potential capacity for manual work by about ten times. This means, of course, that the effects of stoppages of work or of bad timekeeping are similarly magnified.

However, electrification of production demands equipment for electricity supply, and here there is an important question of capital involved. At this time of crisis in the national economy, the early attainment of a yearly rate of plant installation reaching 2,000 MW is imperative, and a capital investment policy allowing this rate of installation is a necessity to economic recovery which cannot be stressed too greatly. There are no outstanding technical problems which cannot be overcome: a plentiful supply of electricity is primarily a question of the availability of the necessary capital.

The electrical manufacturing industry has a part to play here as well, because of its outstanding efforts in the export field. As for generations cotton and coal have been the staple of our overseas trade, so engineering is now the staple of the future. Electrical manufacturers contribute, directly and indirectly, something over £250m. to the total value of exports, engineering as a whole accounting for £1,074m.

These export figures must be expanded, and for this a fundamental requirement is that the industry concerned shall have a stable, progressive and resourceful home market. To this end, home markets need freedom from all artificial handicaps.

The problem was to arouse public appreciation of the country's dire need. Much had been done, but it was imperative to get John Bull to take off his coat and exert further effort toward prosperity.

1953

Mr. E. R. WILKINSON

explains that only with

extended electrification can come

# INCREASED INDUSTRIAL PRODUCTION

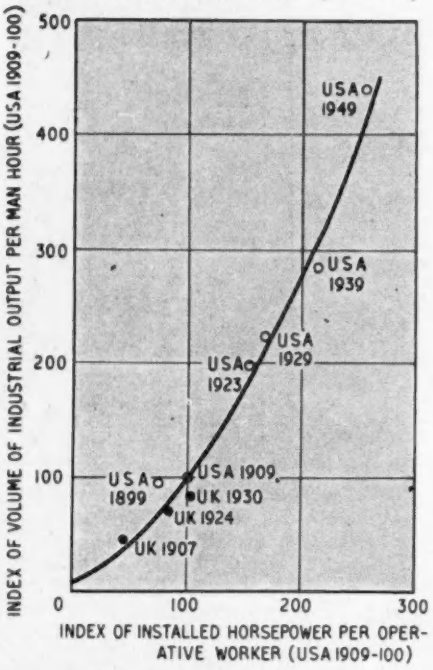
INDUSTRIAL expansion is commonly recognised as being essential for the national economy, and electricity has a key part to play in securing it. Throughout the world, the experience of recent years has shown that the expansion in the use of electricity is decidedly greater in scale than either the growth in industrial production or the increase in the volume of industrial production. There are three main causes for this. Change over from less efficient forms of power has accelerated as the availability, dependability and relative cost of electricity have improved; the application of electricity has increased production per worker because of its flexibility and adaptability; and the increased range and complexity of industrial products has meant that more work is required per article produced.

In Great Britain, one of the characteristics of this expanding use of electricity has been the relatively high proportion of the electricity requirements of industry which are obtained from the public supply. Published statistics suggest 74% in 1950, against 60% for the average of continental countries participating of the European Coal and Steel Community.

As a long term trend, it is reasonably certain that the rate of increase of productivity becomes faster as mechanisation becomes more comprehensive: this in spite of contrary suggestions from "the law of diminishing returns." It seems that even in America, the scope for further mechanisation is far from exhausted. America, of course, provides a common basis of comparison in productivity studies: but it must be emphasised that the usual "horsepower

*Left: Mr. and Mrs. A. G. Macintyre, Mrs. B. Keywood, Mr. A. B. Collins and Mr. B. Keywood. Right: Messrs. H. C. White, W. J. Jones and J. G. Christopher*

*Relation between mechanisation and productivity*




per operative" is an unreasonable comparison, partly because of the prevalence of shift working in the States, but also because there are many industries in America with relatively few workmen using large quantities of energy.

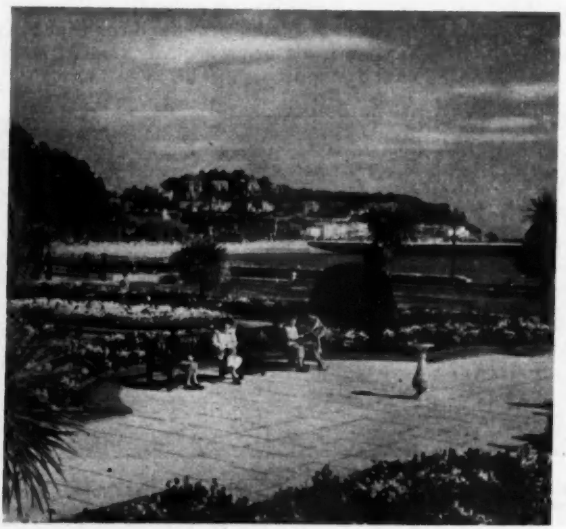
However, weighted according to the British distribution of employment between groups, Britain's use of industrial power (in terms of kWh) needs to be about three times greater to reach the American standard. The ratio appears to have worsened since 1935, when it was 2¾, and published plant expansion programmes on both sides of the Atlantic suggest that it will deteriorate still further.

Yet more motors are not the only answer required. It has been suggested that some 20% of the gross U.S. expenditure on fixed plant and machinery is devoted to electronic devices of all kinds, whereas the British figure is only between 3 and 4%. The automatic control facilities that electronic techniques offer are of the greatest value to productivity.

## *Capital Investment*

All of this leads inevitably to the question of capital investment, which must be on a much larger scale than at present if Britain is to achieve the more rapid and comprehensive progress in industrial electrification that is essential to her rehabilitation. Shift working could help, but non-physical factors such as savings and taxation are essentially involved.

Investment in generating plant by private companies can be justified in only a few cases. It follows, however, that if the industrialist is to be relieved of this capital expenditure, and advised to spend his money on large-scale machine re-equipment, then he must be assured of the adequacy of the public power provision. Here the picture is quite unsatisfactory. Although some quarters allege that the supply industry is absorbing too much of the capital available in the country, the reverse appears to be the case. It is estimated, for instance, that Western Europe has been devoting a larger proportion of its annual income to industrial capital purposes than has Great Britain, and has been allocating a greater share of that larger proportion to the needs of electricity supply. Every effort must be made to increase the total volume of capital and of the proportion allocated to industrial re-equipment.



*The Abbey Gardens, one of Torquay's beauty spots, looks across the bay*

1953

In Wednesday's session three technical papers concern outstanding problems. The first presented concerns

A. O. JOHNSON (*left*) N.W. El. Bd.; and C. P. HOLDER, M-V. Co.

# *Supplies for Industry*

COST per unit and reliability are the basic factors in deciding whether a factory shall decide on the public supply or on private generation for its electrical power. Comparisons between 1935 and 1945 show that the public supply has been increasingly preferred during that period. Though there has been no marked change-over from private generation, most of the increased electricity required by industry has been taken from the public supply.

From 1935 to 1945, various circumstances enabled the electricity supply industry to avoid passing on large increases to its consumers in a period of generally rising costs. The Grid interconnection helped, and also three-shift working, and the operation of plants beyond their usual life during the war. Unfortunately, some of these factors acted as delayed bombshells when after the war, single-shift working was resumed, and plant replacements and expansion had to be carried out at a high capital cost. Though the new plant has an increased thermal efficiency, this has been completely outweighed by the many other costs which have increased steeply.

## *Costs and Tariffs*

These costs must, of course, be recovered by a correctly designed industrial tariff. In this connection, the widely varying size of consumers is of importance. In the N.W.E.B., for example, 70% of all industrial consumers have loads between 40 and 200 kW; yet over 40% of the total units are taken by consumers with loads between 1,000 and 5,000 kW. Further, 79% of the consumers have load factors below 25%, but consume only 42% of the total units supplied. These figures exclude a few very large consumers with loads from 5 to 40 MW.

Such factors must be reflected in the tariffs, which are most conveniently of the two-part structure. Since in general the cost per kilowatt of providing an industrial supply will tend to decrease with increasing load required, steps are justified in the maximum demand charge of the standard industrial tariff. The method of supply must also be allowed for, the charges taking account of who supplies the substation building, transformers and associated switchgear, and the voltage of supply and of metering. Bad power factor, too, must be penalised, either by the adoption of kVA as a basis for the maximum demand charge or by the incorporation of penalty clauses.

## *Pattern of Demand*

Special arrangements must be made to cater for consumers whose highest demands occur in the summer months, perhaps by giving a reduced demand charge for the excess over winter month demands. Where a monthly maximum demand is charged, care must be taken with consumers who depart from the normal pattern of industry on which it is based. For instance, a consumer with an unusually high proportion of lighting should be restricted to an annual or a quarterly tariff, while for consumers whose m.d. varies little during the year should be allowed a yearly m.d. charge.

Load factors much above 25% are of course encouraged by the two-part tariff, which automatically reduces the cost per unit because the m.d. component remains fixed. In appropriate circumstances it may be possible to offer the

further incentive of a stepped running charge. Higher maximum demands outside normal day-shift hours will, of course, justify a reduced demand charge.

For the N.W.E.B., the cost per unit taking into account all these factors can vary between 1·5891d. for a consumer with 200 kW m.d., 20% load factor, supplied at l.v., down to 0·8122 for a 2,000 kW m.d. at 100% load factor, with the consumer supplying his own transformer and being metered on the h.v. side (1·3902 for 20% load factor). These figures are for fuel at 65s. ton and for 0·9 p.f.

### *Private Supplies*

Private generation by back-pressure on pass-out sets provide the basis for the strongest claims for private generation, and they are dealt with in the Convention paper by Messrs. Prosser and Pedder. For other methods, heat balance does not enter into the considerations, and provided the firm concerned can find the necessary capital then only overall costs of private generation and of purchased energy need be considered. Comparisons of costs for a 1,000 kW maximum demand for various methods of generation are shown in the table, though this must of course involve many assumptions.

SUMMARY OF COMPARATIVE COSTS FOR 1,000 kW M.D.

| Method of Supply | Cost per unit | |
|---|---|---|
| | 20% load factor | 40% load factor |
| Diesel oil engine ... ... | 1·927d. | 1·537d. |
| Steam-turbine driven alternator | 2·051d. | 1·554d. |
| Existing factory steam engine* | 2·162d. | 1·875d. |
| Public supply† ... ... ... | 1·862d. | 1·222d. |

*No capital charges. † Includes electricians' wages.

It seems likely that the only circumstances where private generation is likely to compete with the public supply are: combined electricity and steam supplies; availability of very low-grade fuels; availability of waste heat; large loads of low load factor on old private plant; and large loads of high-load factor on new private plant.

Usually, of course, stand-by supplied from the public system will be required, and these will increase the cost and will demand special tariffs. If private plant is operated in parallel with the public supply, the human element in synchronising needs most careful consideration. The earthing of the private generator is also a problem—it must be earthed when it is tripped off the public supply, yet the earth must be removed when it is operating in parallel. Third harmonics are another potential cause of trouble.

*(1) Mrs. J. Oldroyd, Mr. G. C. Stebbing, Mr. J. Oldroyd and Mr. A. H. Gambling. (2) Mrs. Ferguson, Mr. T. G. Christie and Mr. Ferguson. (3) Messrs. R. E. Davies, A. E. Knights, E. M. Selley, R. E. Silvey, D. Hurst, J. S. Selley and J. Tillotson. (4) Mr. and Mrs. H. M. Lacey and Mr. and Mrs. A. B. Collins*

1953

The second paper in this series presented by H. S. PROSSER and A. W. PEDDER (right) concerns problems of

A. W. PEDDER, Merz and McLellan: and H. S. PROSSER, B.E.A.

# Combined Heat and Electric Supplies

COMBINING the generation of electricity with heat supply provides one solution to the problem of raising thermal efficiency. Technically, this has been proved fully practicable: any impediment to the widespread adoption of heat-electric generation must, therefore, be essentially economic in character.

For domestic supplies, immediate economic difficulties are presented by the fact that for several reasons, relatively high heat consumption is in practice inseparable from a distant heating scheme. An important factor is the absence of any sufficiently cheap heat meter. For an average home with 500 sq ft floor area, the yearly consumption is estimated at 600 therms: 350 for space heating and 250 for hot water. For 1,000 sq ft it will be 900 therms/year. A hot water accumulator is important in a district heating scheme as a means of smoothing the demand.

## *Heat Sources*

Direct use of heat rejected from normal power stations is not practicable, as the cooling water leaving temperature is only 100° F against the 200° F required for district heating. Limited use might, however, be made of existing stations by taking additional steam from bleed points on main turbines, or by installing special back-pressure sets. The suggestion that new B.E.A. stations should be sited adjacent to areas suitable for the development of district heating schemes is virtually impossible in practice if the B.E.A.'s present plant extension is to be maintained. Even a 120 MW back-pressure station would supply heat for a population of 220,000, and a new town of this magnitude could not be created in the time it takes to build a station. The alternative of supplying an existing town would involve breaking up the streets for distribution purposes, and the cost would be prohibitive.

The inescapable conclusion is that, in general district heating schemes will have to be supplied by relatively small heat-electric stations, designed primarily for the purpose of meeting the heat load. If costs are calculated on this assumption, giving the heat supply the benefit of increased efficiency, with coal at 70s/ton and 11,000 B.Th.U/lb, costs for three schemes are as given in the table. In the capital cost, £64/consumer is allowed for hot water mains, and £38/consumer for necessary ducts etc.

COST OF DOMESTIC HEAT SUPPLIES FROM SPECIALLY CONSTRUCTED HEAT-ELECTRIC STATIONS

| Number of consumers | 2,000 | 4,000 | 16,000 |
|---|---|---|---|
| Total cost to consumer £/year ... ... | 32·55 | 28·80 | 24·70 |
| Fuel consumption/consumer, tons/year ... | 3·38 | 3·05 | 2·80 |
| Capital cost/consumer, £ | 235 | 216 | 195 |

Where an existing station may be used, and back-pressure sets installed, the costs in the top line become £29·70, 26·41 and 23·50. Using bled steam they are £24·22, 22·12, 20·15. If direct heat production were used, the figures would be £32·25, 31·55 and 30·40.

District heating may be shown by such comparisons to save coal only if a main power station is available as a source of heat supply. Annual cost to the consumer will be 50-100% more than with conventional methods of heating—but about three times the useful heat will be received. District heating by direct heat

production would result in the consumption of 50% more coal than with conventional heating.

For commercial premises, the absence of a large hot-water demand combined with a poor load factor alters cost to some extent. Coal would be saved, but the cost per therm would be cheaper only when a highly concentrated load is coupled with favourable distribution conditions.

### *Industrial Supplies*

Where industrial supplies of heat are considered, three questions have to be answered. Would heat-electric generation by the individual factory result in a national saving of fuel? What additional capital expenditure would be required to embark on heat-electric generation, and how would this affect annual costs for the factory? Finally, could the situation be improved by supplying a group of factories from a specially designed heat-electric station?

Many considerations determine the answers to these questions. For instance, the value of electrical output must be determined by area board charges. When all the possibilities have been taken into account, the following conclusions are reached for factory heat-electric generation : both total size of installation and load factor of steam requirements have a great effect on the gross return from a scheme; the lower the pressure at which the process steam is used, the more favourable is the case for back-pressure generation. Generally speaking, one can assume that with a 25 klb/hr installation, the case for generation is marginal at 80% steam load factor, and is definitely not profitable if the load factor is as low as 40%. For a 100 klb/hr installation, generation is worth while at 40%, and is highly profitable at 80%. Initial steam pressure is of relatively little importance. The overall coal saving is considerable, varying from some 10,000 to 17,000 tons/year at 100 klb/hr at 80% load factor.

With centralised heat-electric generation, costs are inevitably greatly influenced by the cost of distribution. However, when these can be kept to reasonable proportions the result is comparable to that of heat-electric generation by individual factories. Probably the greatest attraction of group schemes is that they present a means of obtaining for the nation the benefit of the fuel economy associated with heat-electric generation in cases where the individual factories would not install back-presssure generating plant because of the difficulty of raising the capital that is needed.

*(1) Mr. and Mrs. R. A. McMahon and Mr. F. N. Beaumont. (2) Mr. W. J. Humphreys, Ald. W. S. Lewis, Messrs. C. Cameron Kirby, A. W. Gray and R. Lee. (3) Messrs. J. I. Bernard, G. W. Clarkson, S. Johnson, E. C. Avery. (4) Messrs. D. T. Leatherwood, H. C. Spence, G. A. Gordon, R. C. Barrett, C. F. Walkland and W. B. Noddings*

1953

The final paper in the Wednesday session is presented by T. B. ROLLS (McLellan & Partners)

# Factory Distribution and Control

APART from the direct financial and production considerations which affect the supply of electricity to industry, there are always many technical factors to be taken into account. One of these is that of continuity of supply. In most cases duplication of supplies should not be necessary for normal manufacturing processes, though there are some obvious exceptions to this general rule.

Industrial substations are usually arranged with the transformers outdoors, each in a separate fireproof pen. Fire risk considerations led to this arrangement, and it is technically satisfactory. However, with electrical equipment and particularly cables being very expensive at the present time, more economical ways of carrying out factory distribution are desirable. In the United States, unit substations are produced, and located inside the factory at load centres. They contain high and low voltage switchgear and a transformer, the transformers being filled with a non-inflammable fluid and the switchgear air-break. We might do the same in Britain, using metal-clad switch fusegear, instead of air-break l.v. switchgear. However, British transformer manufacturers seem unwilling to use a non-inflammable liquid insulant, and with some justification. Neither is air-break h.v. switchgear (say 11 kV, 250 MVA) available, but possibly h.v. switchgear could be avoided altogether, by looping the transformers of three or four unit substations from one oil switch located in a small conventional substation outside the main factory buildings. In a large factory, a secondary network might be built up, with adjacent transformers fed by different h.v. feeders.

A control and protection problem which attains some importance in large factories is concerned with motors operating at 3·3 kV. Such motors are connected to large distribution systems, and the control gear must have a high breaking capacity. In the absence of other suitable equipment, it becomes necessary to use switchgear of the type normally used on distribution systems; then it is often found that the switchgear maker has a limited knowledge of motor control.

## Control Gear Qualities

In these circumstances points to be watched include simplicity of protection and operation (since the operator will be unskilled electrically), the provision of undervoltage protection, and of instantaneous overcurrent and earth leakage protection. Batteries should be avoided in order to reduce maintenance, instrumentation should be simple, and the likelihood of long leads must be borne in mind with reference to c.t. secondaries.

Oil circuit-breakers may be used for motor control where operation is relatively infrequent, but otherwise air-break switchgear is advisable. The use of air-break contactors is an alternative, but in this case protection against short circuits presents some difficulty. In this respect the development of 3·3 kV cartridge fuses of ratings above 200 amp would be valuable.

For motors at the other end of the scale—those driving portable tools—the question sometimes arises whether electricity is better than compressed air for their power supply. It is not often realised what an expensive form of power is an air motor. When an electric motor

is used to drive a compressor for operating air tools, the consumption of electricity may be between three and ten times more than for electrically-driven tools, the amount varying wi h the leaks in the air system. Where high tool speeds are required, the use of high frequency supplies may be worth considering. For instance, an experimental die grinder has been running from a 1,400 c/s supply with a synchronous speed of 84,000 r.p.m., the tool being about the size of a large pencil.

There is one way in which electricity can interfere with production. This is by causing accidents. Yet most electrical shock accidents are avoidable. Portable apparatus is particularly troublesome, but double-wound transformers can reduce the risk, 110 V centre-tap earthed being usual. The fire risk associated with electricity is another matter. When a fire is caused by electricity, sustained leakage is usually involved, and this in turn is commonly due to a combination of unsuitable protection and ineffective earthing. In an industrial system the best answer may be really close bonding of all cable sheaths and casings, and the neutrals of distribution transformers.

*(1) Messrs. T. R. Smith, W. Gilchrist, J. Rankin and J. E. Hayes. (2) Messrs. D. Leatherwood, H. Brierley, J. E. Blair, A. C. Thirtle, W. L. Humphreys and J. S. Pickles. (3) Messrs. W. J. Guscott, S. C. Alden-Brown, A. W. Gray, W. H. Warhurst and J. R. Jones. (4) Mr. H. J. Bennett, Mr. and Mrs. Priest, Mr. and Mrs. H. D. Watson. (5) Messrs. C. W. Blake, F. C. Fenton and I. J. Hayward. (6) Lord Citrine talks with Mr. Eccles and another delegate after the B.E.A. private meeting*

# *More Power for Farmers*

SPEAKING at a B.E.A. Conference at Torquay on Monday last, Lord Citrine stated that in view of the importance of rural electrification to the national well-being it was probable that consultation with the Government would be necessary. There was little doubt that the demand for the widespread extension of electricity to rural areas would become more insistent and more capital would have to be made available to meet this. While the overall consumption of electricity by farms and rural consumers had generally shown a substantial increase, much more extended use could be made of electricity in the countryside. The problem was how to extend rural electrification to sparsely populated areas without involving the boards in serious financial losses.

Reviewing progress, Lord Citrine pointed out that despite capital restrictions and economic considerations, some 46,000 additional farms have been connected in the past five years, of these some 10,163 were connected during 1952-53, bringing the total number of farms with a supply at March 31st of this year up to 129,500. This represented about 43% of the total number of farms in the country. At vesting date the figure was about 27%.

The consumption of electricity by farms had increased by about 170% as compared with the year immediately preceding the vesting date. In 1952-53 consumption by farms increased by 17% as compared with the previous year, this increase again being the highest of any class of consumer.

# ELECTRICITY WELDS GLASS

ELECTRICAL methods for welding thick-wall glass tubing have been adopted by Messrs. Quickfit and Quartz Ltd. to increase production efficiency in their manufacture of large-scale glass plant. When two ends of such tubing are to be butt-welded, it is essential that the surfaces being brought together are heated uniformly to the same temperature. Glass being of poor thermal conductivity, oxy/coal-gas jets applied to the outside surface of the tubing do not always ensure uniformity of heating throughout the wall. By utilising, however, the electrical conductivity of glass, quicker and more efficient heating and welding has been obtained.

*Here is shown electric glass welding in operation. Note the burner/electrodes, mounted on glass insulators*

At a recent visit to the company's works at Stone, Staffordshire, advantages of this method of heating were demonstrated. Initially, adjacent ends of the lengths of tubing (which are revolved in a lathe) are heated by diametrically opposed single gas jets to raise the temperature of the glass to above 300° C, at which point it has an appreciable conductivity.

Using the gas burners as electrodes, an arc is struck between them, using a voltage source of 10 kV (nominal). A current of approximately 3 amp flows to the glass, dividing into two paths round each half-circle of the tubing. By ohmic heating, the temperature of the end surface of each tube is rapidly raised to melting point, at which the two ends are brought together and the arc maintained to ensure a complete fusing of the surfaces.

As already stated, a nominal 10 kV supply is used, derived from a spark-gap oscillator generating a pulse of frequency approximately 120 kc/s. Due to the rapid variation in load, the resistance of the glass falling in a few seconds from 10 MΩ to 2 kΩ, means are provided to ensure that the output circuit of the supply is continually matched to that of the load. Use of an h.f. supply minimises danger to staff from electrical shock.

NOTES ON WIRING by Megohm

# *More Shortages*

IN a very interesting paper given to members of the Association of Supervising Electrical Engineers in London recently, Mr. J. I. Bernard, the chief technical officer of the Electrical Development Association, said people generally begin to develop a distaste for gas fumes only when they go in for electric cooking. The electric cooker should be regarded as the centre or key of the all-electric home. Everyone who has gone over to electric cooking will agree that it is the cleanest, most convenient and economic method for cooking, and there are no greasy surrounds, black pots and pans to mar the kitchen shelves.

## *Electric Cooking Everywhere*

How right Mr. Bernard is when he says the electric cooker deserves the universal support of all in the electrical industry and that steps should be taken to make electric cooking available to everyone. Unfortunately, during the past few years several restrictions, some of them maybe unnecessary, have been imposed to make the installation of electric cookers in homes more and more difficult—for example, the withdrawal of hiring facilities or the purchase of cookers on deferred terms has no doubt prevented many people from having them. These facilities should be restored as quickly as possible to enable the housewife to have the opportunity of readily obtaining and using electric cookers and utensils.

Another factor that is restricting the full use of electric cookers is the insufficient capacity of the supply authority's low-tension networks in some areas. In one area I am told residents in large blocks of flats cannot have electric cookers because the distribution network and the rising mains in the flat blocks are not man enough to carry a cooker load. Consumers who would be prepared to purchase a cooker and meet the cost for wiring the cooker point from the meter and consumer's terminal within the flat object, however, to meeting a bill for rising mains, since they contend that in the case of consumers occupying houses electrical energy is supplied up to the house terminals without direct charge, so why should not the supply authority also provide equal facilities in multi-floor flat blocks.

Here is a subject which is no doubt known to the B.E.A. area boards, and they should endeavour to put right as quickly as possible a situation that favours one consumer more than another.

It is quite remarkable how small are the rising mains that have been installed in some modern blocks of flats which were built not more than 25 years ago, and what these mains have to carry today. In one case, a typical two-bedroom flat installation consisted of six lighting points, seven 2 amp socket outlets and three 5 amp socket outlets, which were connected to a three-way d.p. splitter switch unit with a pair of 7/·036 v.r.i. sub main cables connected to 2-7/·064 v.r.i. rising main cables enclosed in conduit. The connected load in this flat was for:—

| | |
|---|---|
| Lighting .. .. .. .. | 1,200 W |
| Occasional fires .. .. .. | 6,000 W |
| Television, radiogram and portable radio .. .. .. | 300 W |
| Refrigerator, vacuum cleaner and iron .. .. .. | 1,500 W |
| Total | 9,000 W |

I am told that there are three similar flats connected to this rising main, although not necessarily the same loadings are applicable to the other flats. It is, nevertheless, reasonable to assume that this main was more than fully loaded. The location of these flats is in the Southern Area, and on application to the Area Board showrooms the consumer was advised that nothing could be done at the present time since in this area the d.c. distribution network was overloaded and the particular flat block could not be changed over.

## *Energetic Attack*

Surely here is a position that must be tackled soon and energetically so that supplies are made available to consumers who wish to have the full benefits of electricity with an electric cooker as centrepiece in an all-electric home.

Maybe there is something in what some contractors are saying that the Area Boards would be more usefully employed overhauling and improving their distribution networks than endeavouring to compete with them in installing internal wiring in buildings.

# WIRING — *Yesterday, today and tomorrow*

Past developments and future prospects are reviewed in this article by **J. MELLANBY, M.A., A.M.I.E.E., M.Inst.F.**

## *PART ONE*

WHILE there are many excellent and interesting publications covering numerous aspects of the historical development of electricity during the past century, from being a scientific curiosity to becoming a group of major industries, the wiring of buildings appears to have been neglected. The present review, while making no claim to be more than a mere synopsis of the subject, will, it is hoped show how progress in installation practice has depended on methods of building construction and manufacture; on world trends in prices and availability of materials; of demand for electrical services, and even of fashion. Finally an attempt will be made to review current methods, to suggest that certain systems have outlived their usefulness, and further developments along other lines might be advantageous. While British practice is specifically referred to, this has to some extent been affected by progress in other countries, notably the U.S.A. and the continent of Europe and a comprehensive history would have to devote some attention to foreign methods.

### *Cinderella of Electricity*

Wiring may well be regarded as the Cinderella of electricity—taken for granted—though without its services other branches could not carry on. It has been despised by the "highbrows" within the industry, and in education, and seized upon as a profitable side-line by jobbing builders in the past, or as an activity for the area boards of today. The statement, "I know nothing about electricity, but of course I can wire up a house" used to be heard quite often. Even today it may still be encountered in the under-developed parts of the Commonwealth. Progress and development have been almost entirely due to the various manufacturers of installation materials, frequently with the encouragement of electrical contractors and to satisfy their demands, and neither academic research nor the supply side of the industry appear to have contributed a single major advance. In fact, as will be seen, conservatism on the part of the public, supply companies, insurance offices and others, delayed the general adoption of many components and methods for years after the makers had first developed them.

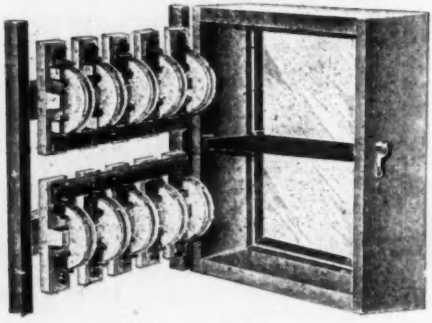
For the sake of brevity, the very early developments will be passed over, and our review will start about 1890. By this time v.i.r. cables, of the type known as taped, braided and compounded, were in general use and were not very different from similar cables manufactured today, while the b.c. lampholder, stone link tumbler switch and ceiling rose had also made their appearance. Cables were practically universally protected by wood casing, and the primitive state of development was mainly shown in items like main switchgear, fuse and distribution boards and the almost complete absence of plugs and sockets. The first wiremen were originally carpenters or bell-hangers who had been instructed in the "new system of electrical lighting." Apart from the capping and casing, there was a great deal of wood in all early installations, and the use of this material for mounting blocks for switches and accessories and for the cases of fuse "boards" persists today. Even the expression "ironclad distribution board" is firmly established as one of the inconsistencies which makes English technical jargon what it is.

In this review we are not concerned with the technical advantages or demerits of wood casing as a wiring system. Some installations are still in service after more than half a century, while others have contributed to destructive fires following "the fusing of an electric wire." Two reasons hastened its disappearance: its unsightliness and its unsuitability for completely concealed work, and its undue cost in highly skilled labour. It is interesting that its use in Aberdeen persisted until the 1930's, and that in some quarters it was considered the ideal system for the Tropics at an equally late date.

## Conduit System

The theory behind wood casing, requiring the separation of conductors of opposite polarity in different grooves, implied little confidence in the cable makers of the day, hence it must have been a daring man who first inserted two cables into a length of gas pipe or barrel, and so invented the conduit system. The use of the word "barrel" to describe tube dates from the early years of the Gas Light and Coke Co., some of whose first pipes were made from old musket barrels, but the word should not be applied to any tubing made specifically for electrical purposes. The Americans apparently pioneered a tubing system, but there must have been early troubles because about 1895 they brought out tubing with an insulating lining, which was, soon after, introduced to Britain. These troubles were probably due to the use of old gas piping containing deposits of naphthalene or other hydrocarbons which would rapidly destroy the rubber of the cables. This American system included a range of fittings, bends, tees, junction boxes, etc., specially made and designed for electrical use, and is usually considered the real forerunner of the modern conduits, which appeared in 1897. With growing confidence in the quality of the insulation of cables, lined tubes disappeared, and the idea of enclosing the wiring in an all-metal system was firmly established, though it was some time before there was general realisation of the necessity for this enclosure to be electrically continuous and earthed. The Simplex system of 1897 was a "slip" system, using plain close joint tube pushed into plain sockets in the fittings, with no attempt at continuity, but the same firm introduced their screwed system very soon after, the dimensional standards of which have survived practically unchanged up to the current British Standard Specification.

*Shown in this figure are wiring accessories in the development. On the near right are shown an electrolier suspender and watertight ironclad switch of 1909 by the Metallic Seamless Tube Co. Below is shown a 1902 vintage "Stellite" distribution board of Electric and Ordnance Accessories Co. manufacture, whilst on extreme right can be seen fittings for a 1909 wiring system—the Stannos "Metacase," developed by Siemens Bros.*



## Accessory Development

By 1900, therefore, the position was that the original wood casing was being superseded by conduit, of which two types were available, heavy gauge screwed for better class work and light gauge slip for cheap jobs. During these closing years of the nineteenth century many other accessories were developed, though they did not come into general use for many years. The original main switches were open knife switches mounted on insulating panels of slate or marble. Ironclad switches developed from them by mounting them in cast iron boxes, in the earliest types of which the handle projected through a slot. Under conditions of severe arcing this could permit the escape of flame and burning metal, so that safer types were soon designed. The early fuses consisted of exposed terminals to which the fuse wire was attached, but although cartridge fuses were introduced from Germany, and Dorman & Smith developed the first really effective replacement type

of porcelain fuse carrier before 1900, the use of the primitive patterns persisted, This was especially so in smaller domestic installations, where the main control gear comprised two tumbler switches coupled by a bar and a number of circular "chamber fuses" or, as they were later called, bow cut-outs. Even when the use of fuses with replaceable carriers became more general, these were generally of the "channel" pattern, in which the wire was placed in a groove on the front of the carrier, so that if one was replaced with a short on the circuit, a nasty burn was the result. It is also interesting that the shuttered socket was first introduced by Crompton's during the same decade.

The next period may be taken as the twenty years from 1900 to 1920, during which the conduit systems continued with few major changes. Although the need for continuity was being increasingly realised, yet the bulk of the wiring done during this period was undoubtedly on the "threaded-in" slip system, which, being the most inconvenient system ever designed for alterations or extensions, must share some of the blame for a reluctance on the part of householders and others to enlarge their installations to make use of domestic appliances while these were being developed. There were a number of methods introduced to obtain continuity on slip conduit systems, starting with the Hexagon Grip Nipple system, which necessitated the use of a screwed fitting one size larger than the tube in use, and a special nipple on each outlet. It was effective, but costly, and the large fittings made it cumbersome. Another short-lived development used compression joints somewhat similar to those for copper water pipes today, but ultimately two main types persisted, those using grub screws and those using "lug-grips." The former, except for one manufacturer who employed a patented screw of special shape were usually mechanically weak, while the latter were only effective if the wireman cleaned the enamel off the ends of the tube.

### *A Flexible System*

However, the most striking feature of this period may be described as the search for a flexible system. As supplies of electricity became more widespread, so the demand went up for wiring existing buildings, mainly houses, and householders asked for a system that should be safe, unobtrusive and inexpensive. Since paper-insulated lead covered cables were now established practice for mains, Callender's Cable Co. used the same principle in their "Kalkos" system, about 1908, but as every termination had to be sealed this was never really popular, though it must be recorded as the first attempt to market a wiring system using an insulator other than rubber. Siemens' "Stannos" system had a greater vogue; this comprised a rubber insulated conductor surrounded by a sheath of tinned copper, applied on the "close joint" principle. This was specially advocated for use on earthed concentric systems, using the sheath as return. However, considerations of multiple earthing forbade the connection of such installations to public mains, unless there were individual transformers for each consumer, as was the case for many years in Egham and Staines, where single phase a.c. at 2,000 volts was stepped down to 100 volts in each house. The search went on and in 1911 Henleys introduced their first "Henley Wiring System," using lead alloy sheathed rubber insulated cables, and junction boxes and other fittings specially designed to make wiring quick and simple. Properly installed it provided a safe and satisfactory method of wiring, but it was perhaps too easy, and enabled many jobbing builders and others to carry out a lot of shoddy work. In spite of competition from other systems of later date, the popularity of "lead covered" was not seriously challenged until World War II made lead a scarce and costly commodity.

### *C.T.S. System*

For many years the French, requiring a really cheap (and perhaps nasty) system, made use of ordinary twisted flexible cords strung on small bobbin insulators. This never had much of a vogue in Britain, but, under the designation of Class "Z" it was permitted for domestic premises under the I.E.E. Regulations of 1924. The growing use of electric power in factories, docks, quarries etc., necessitated big developments in flexible cables to stand up to very arduous conditions. A rubber sheathing similar to the material then coming into use for motor tyres was introduced first by the St. Helens Cable Rubber Co., under the name of Cab Tyre Sheathing (C.T.S.) during World War I. This material was used for covering cables for fixed wiring, and so an all-insulated competitor to the metal sheathed wiring systems was born. The progress made by C.T.S. just after the close of the epoch under consideration owes much to the advocacy of Prof. Parker Smith of Glasgow, who braved his conservative critics by asking "are your conduits really necessary?" This search for a satisfactory and universal flexible system is exemplified in the 1928 Edition of Perren Maycock's Electric Wiring, where, apparently, worried by the cost of C.T.S. cables he still has a hankering after something very like Class "Z."

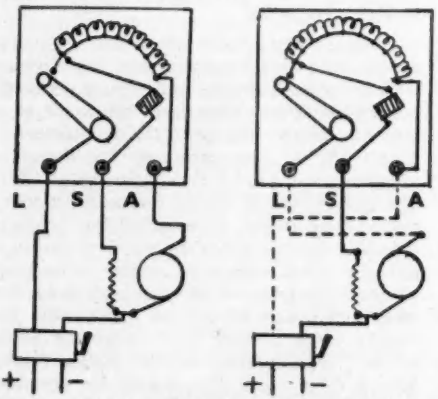
*(To be continued)*

# PROBLEMS AND PRACTICE in Engineering

## *Motor Breakdowns*

THE instructions received by phone from a large works to our repair shop were: "This is works manager of Blank and Co. speaking. We're sending in a 50 h.p., d.c. armature to be rewound. This is a trial job for you. We have the spare running but be as quick as ever you can with the rewind. By the way this motor has a history, but when you get the job opened up I'll come along myself and give you the story."

On its arrival the foreman and I agreed that it looked a well-wound job by whoever did it. The only thing that could be noted was that heavy sparking had taken place round the commutator and, judging by the blobs of copper, perhaps flashing between the brushes. The "Megger" and lamp tests showed "dead earth." On stripping, it was noted that in about two dozen slots the insulation—micanite and leatheroid—was badly punctured and riddled with small holes some of which had joined up to become slots.




*On the left is shown the correct starter connection; on the right, as they were originally*

Here is the story. Spread over a period of roughly four years the original and spare armatures had been twice rewound and the present job was the fifth rewind. On each occasion the nature of the trouble was the same, punctured insulation and earthing.

Whilst the motor was being assembled after the rewind we had a casual look round, examining the connections of starter and motor and everything, as far as could be seen, appeared to be in order. Before giving the motor a run up we asked the man in charge to keep the belt off for the first run. Everything being quite normal, the belt was put on and the manager told the man in charge to start on load. Using a "Heath-Robinson" remote control—for safety—the motor was started up. When, however, it was shut down, and the man in charge drew the main switch to the "off" a flash was seen in the main switch and the cause of all the armature troubles began to show up.

The connections between mains, starter and motor were checked and the result was to find that leads to "Armature" and "Line" on the starter had been reversed when originally connected up. Reference to the diagram will show that when the main switch is put on, the field is immediately energised and that when the motor is stopped by the "remote control" method in operation in this case and the starter falls back to its "off" position, the field is still energised, and that when the main switch is afterwards drawn the field is being broken with the armature stationary. It was this breaking of the field with the armature stationary that caused a high induced e.m.f. in the windings of the armature to cause the insulation trouble.—*J. A. W.*

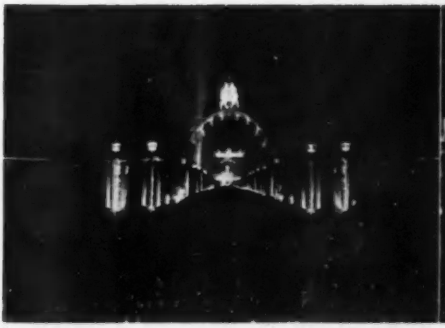
## *Instrument Supplies*

THE instrument section of the industry could be helped in factories, power stations and other installations having either laboratories or valuable instruments that need protection, as shown by the following.

Recently a new electronic pH meter was found to be oscillating several degrees pH. The trouble traced by the author was found to be a heavy machine—not off the same junction box, but off an entirely separate box from the same bars. The surge was passing via the common bus-bars to the delicate pH meter.

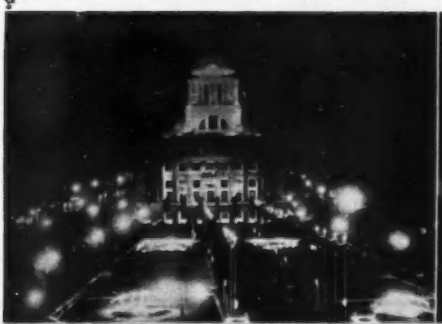
I suggest belatedly that wherever possible these circuits could be entirely free of the main supply—preferably alone—and free from the interference of t.a.s, heavy machinery, etc. Many laboratory technicians and instrument engineers will support this.—*W. W. Hopkinson.*

*Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.*



# Coronation Highlights

*Lighting comes into its own when a nation celebrates such an event as the Coronation of its Sovereign. The wonderful effects of both decorative and floodlighting are evident from these photographs. The upper photographs of London show the thousands who thronged the Mall on Coronation night when Her Majesty switched on London's lighting, which is seen to good effect on this view of the wide sweep of the Thames, with Big Ben (top, right) and the Adelphi and Shell Mex Building towering above Waterloo Bridge, and the Victoria Embankment. The other cities and towns of Britain were no less effective in their illuminations, as readers may judge from these pictures of Nottingham's Council House, the Imperial Hotel at Torquay (scene of the B.E.P.C.), Walmgate Bar, York, and the Hall of Memory at Birmingham. We are indebted to Simplex Electric Ltd. for the two right-hand photographs below*



# overseas news

### New Line

The Quebec Hydro Electric Commission is to construct a new transmission line about 85 miles in length, from Boldean, north of Lake St. John, to the Chibougamau gold mining district. Power for the line will come from the Commission's hydro-electric development on the Bersimis River, on the north shore of the St. Lawrence River, on which preliminary work is already well under way.

### Pine Portage Extension

Engineers of the Hydro Electric Power Commission of Ontario are to start work immediately to double the capacity of the Pine Portage generating station. This station is the most northerly of the Nipigon River stations, about 75 miles from Port Arthur. The plant's capacity is now 82,300 h.p. from two units, but by early 1955 this will be increased to 168,900 kW. The expansion has been designed to meet the continuous municipal and industrial growth in the Commission's north-western division, including the estimated requirements of a new plant proposed by the Caland Ore Company at Atikokan in 1954. Although a work force of 1,500 men was needed three years ago to build the original Pine Portage station, only 100 men will work on installation of the third and fourth units this summer because penstocks for the additional units were constructed in 1950. The third set is expected to be ready for service by September, 1954. Supply to the Caland Ore Co. will require a second 115 KV line from Lakehead to Atikokan, while additional transmission and switching facilities will be needed to incorporate the fourth Pine Portage unit into the system.

### B.C. Development

In addition to extending the Bridge River power plant, to which we referred on May 7, the British Columbia Electric Co., Ltd., is to start work, probably in the early autumn, on the construction of another power station at Seton Creek, some 25 miles east of the Bridge River plant. The station, to have a capacity of 58,500 h.p. operating on a head of 147 ft, will be automatic in operation and controlled from Bridge River by a supervisor carrier system. The Seton Creek station will cost over £8 million, and is expected to be in operation by August, 1955.

### West Indies Plan

The Jamaican Public Service Co. Ltd. has renewed its application for permission to construct a dam on the Black River near Maggotty Falls in order to establish a generating plant to electrify the neighbouring area. But the parochial fathers are uncertain of the effect on the flow of the River. The company already operates several hydro-electric and steam power stations, the newest, the Lower White River hydro-electric station having been commissioned about 15 months ago.

### A Tender Point

In the revised tenders for the supply of four generators for the Chief Joseph dam, on the Columbia River in Washington State, the English Electric Co.'s bid of $4,397,523 was second to that of the Westinghouse Electric Co. ($4,299,822), it has been reported. It will be recalled that when tenders were originally submitted to the U.S. Army Corps of Engineers in April, the English Electric Co.'s offer for the supply of four generators and ten transformers was substantially lower than the nearest U.S. bid, But after much controversy it was decided to call for new tenders on the grounds that the original specifications had not been explicit enough. Since then the English Electric Co.'s tender for the supply of the transformers—at $442,751—has again beaten the American competitors, but the contract has not yet been placed.

### Atomic Power

Atomic power developments in the U.S.A. have been in the news in the past few days. In a speech to the Edison Electric Institute last Thursday, Mr. G. Dean, chairman of the U.S. Atomic Energy Commission, announced that the Commission had proved by practical demonstration at its Arco, Idaho, plant that it was now possible to use breeder reactors. He cautioned his audience not to assume that economic power from atomic energy was here, but the achievement was obviously a milestone of progress.

A few days earlier the Commission made available to American industry four detailed reports by eight concerns that undertook extensive studies of "the prospect for private industrial participation in joint production of electric energy and fissionable material from reactors." Information that is still secret is, of course, omitted from the 94-page booklet. The report states that nuclear power is handicapped by high capital costs, high processing costs and significant fuel costs. The firms who reported include the Commonwealth Edison Co., the Detroit Edison Co., and the Union Electric Co.

### The Biggest Generator?

The Westinghouse Electric Corporation is to build for delivery to the Detroit Edison Co. in 1956 what is claimed to be the world's most powerful turbine generator. Of 260 MW capacity, it will be one of two similar units to be installed at the company's River Rouge power station.

### Sicily's New Station

The new 60 MW power station at Palermo, Sicily, was dedicated last week-end. For this project a $6,300,000 loan was obtained from the Mutual Security Agency, which has also granted further loans totalling some $77 millions for the construction of other power stations throughout Italy. This new station is an indication of the economic revival in southern Italy since the war. It is expected that in the coming twelve months, consumption of electricity in Sicily will reach a total of 1,000 million kWh —approximately five times the pre-war figure.

### Money For Development

In Portugal the Hidro-Electrica do Cavado Co. has been authorised to issue 50,000 bonds of 1,000 escudos each bearing interest at 5%. Under Portugal's Six-Year Plan that company is to undertake hydro-electric power projects in the Cavado river valley and this bond issue will be a means of raising funds from the public rather than from Government sources for those projects.

### Report on 5-Year Plan

The progress of irrigation and power projects in India's Five-Year Plan has been generally satisfactory during the first two years, according to the report presented to Parliament by Mr. G. L. Nanda, recently. The results show that the targets fixed for the years 1952-53, have been substantially attained. It was anticipated that 239 MW of new power plant would be installed by 1952-53, whereas 315 MW had actually been installed, including 50 MW at the Bokaro thermal station. On the Bhakra-Nangal project, it is stated that part of the equipment for the two power houses and the material for the transmission lines had been received. According to present expectations the No. 1 power house and a large part of the transmission system should be commissioned by the middle of 1954.

### Pakistan Industrialisation

A group of Yugoslav industrial undertakings, including the Litostroj turbine works, the Rade Konca electric motor factory, the Prvoniajaka boiler works and the Slavonski Brod locomotive works, have entered into a two-year association with the Karachi firm of A. M. Lotia and Co., with the aim of planning the import into Pakistan of capital equipment from Yugoslavia.

### Electrifying the Towns

The Government of Bahawalpur, Pakistan, has decided to electrify two more towns—Chishtian and Bahawalnagar. A sum of Rs. 12,50,000 has been provided in the current year's budget of the State for undertaking these two electrification schemes and also to complete the electrification of Ahmadpur now in progress. Last year the Government of Bahawalpur spent Rs. 13.10 lakh on the electrification of three principal towns of the State—Rahimyarkhan, Khanpur and Ahmadpur East.

### Increased Duty on Transformers

The Government of India has accepted the Tariff Commission's recommendation that the import duty on power and distribution transformers up to 2,500 kW and 37·5 kV, excluding furnace, rectifier and flameproof types, should be increased from the present 5% *ad valorem* to 10%, exclusive of surcharge, and converted into a protective duty to remain in force till the end of 1955. The Government also agreed to the Commission's recommendation to increase the import duty on transformer oil imported with protected categories of transformers to 27% *ad valorem*.

### Progress Report

Having inspected the site of the new power station being built at Lake Macquarie, Mr. H. G. Conde, chairman of the New South Wales Electricity Commission, has stated that he was satisfied good progress was being made. Construction work has now reached the stage where the boiler and turbine contractors can begin. Foundations have been completed, a water channel and canal three-quarters completed, and a 250 ft. high stack erected but not yet lined. The first of three 50,000 kW units is expected to be operating in the first half of 1955, and the second and third by the winter of 1956. Three more units of about the same size will follow in 1957-58-59, but this part of the programme is subject to investigation as to the type and size of plant to be installed.

### Brisbane's Puzzle

The decision of Brisbane City Council to build a section of the Tennyson power-house by direct labour, at an estimated cost of £117,660 while rejecting a tender by private contract of £103,200, has caused some comment in that city. Moreover, it is pointed out that with the Council utilising day labour the job may take anything from six months to a year longer to complete. And this at a time when the Tennyson power-house is an urgent work needed to relieve the city from winter restrictions on its use of electric power. To supervise the construction of the station, a three-man committee has been formed, consisting of Mr. W. Nichol, construction engineer of the Transport Department, Mr. K. Roberts, resident engineer at the power house, and Mr. G. J. Skinner, accounts clerk, electricity department.

### Another Proposal

The installation of hydro-electric generating plant at the Warragamba Dam, New South Wales, has been approved in principle by the Water Board. At a recent meeting of the Board, the president, Dr. T. H. Upton, said the N.S.W. Electricity Commission would investigate the type of plant to be installed at the dam. Special legislation might be needed to allow the board to dispose of its electricity. The dam would be completed in about four years. It would retain 46,000 million gallons of water.

# *PERSONALITIES*

## IN THE INDUSTRY

Chosen for the post of station superintendent at the new Bold generating station of the Merseyside and North Western Division of the B.E.A., is **Mr. R. Thistleton,** A.M.I.E.E., M.Inst.F., who, since 1947, has held a similar position at the Division's St. Helens power station. Educated at Burnley Municipal College and trained at Bradford and Portsmouth Technical Colleges, he joined the Burnley Electricity Department in 1927. After periods with the Keighley and Portsmouth undertakings, he became an assistant engineer with the Central Electricity Board in 1941, but in 1943 was appointed shift charge engineer at the South Wales Power Co.'s Upper Boat power station. From 1945 to 1947 he served at the H.Q. of the Control Commission in Germany on the recommissioning of generating stations which had been damaged in air raids. He takes up his new duties on July 1.

*Mr. R. Thistleton*

**Mr. P. T. Bliss,** M.I.S.M.A., M.I.A.M.A., has been appointed sales director of G. A. Harvey and Co. (London), Ltd. He joined the company in 1909, and has been sales manager for a number of years.

**Mr. N. A. Jenkinson** has been appointed London manager of the Crane Department of Babcock and Wilcox, Ltd., upon the retirement of **Mr. A. Merry.** Mr. Jenkinson has been associated with the crane and conveyor manufacturing activities of the company for the last fourteen years.

Previously southern area representative with Cable Covers, Ltd., for many years, **Mr. I. H. Leitch** has been appointed sales manager to that company.

At present shift charge engineer at Nechells "B" generating station, Midlands Division, B.E.A., **Mr. F. A. Jeff,** A.M.I.E.E., A.M.Inst.F., has been appointed deputy power station superintendent at Plymouth "A" generating station, South Western Division, with effect from July 1.

**Mr. W. J. Prior,** A.M.I.E.E., has been appointed deputy station superintendent at Keady power station, Yorkshire Division, B.E.A. He was previously boiler house superintendent at that station.

Following upon the death of Mr. C. W. Buckley, last month, **Mr. R. C. Taylor** has been elected chairman of the directors of Santon, Ltd.

For the first time in its 48-years' history, the National and Local Government Officers' Association is to have an official in the Electricity Supply Service as its President. He is **Mr. Thomas Nolan,** A.C.I.S., accountant to the No. 4 (Leeds) sub-area of the Yorkshire Electricity Board (as we have already reported) and he will be inducted as President for 1953-4 at the conclusion of N.A.L.G.O.'s Annual Conference at Llandudno tomorrow, June 12.

Today, June 11, brings the retirement of **Mr. W. G. Turnbull,** B.Sc., M.I.E.E., A.M.Inst.C.E., chief electrical engineer to the Staveley Iron and Chemical Co., Ltd., after over thirteen years' service in that capacity. We understand that his services are being retained in an advisory capacity for the Staveley group of companies, and he will continue to reside at "Oaklands," Barlow, Sheffield. A Scot, Mr. Turnbull was educated at George Watson College, Edinburgh, and Edinburgh University, and served an apprenticeship with Bruce Peebles and Co. He became assistant works manager of the Shotts Iron Co. in 1910, and after war service he rejoined that company and was appointed chief engineer in 1919. Two years later he took up the position of chief electrical and mechanical engineer with the Dalmellington Iron Co. which company was subsequently merged in Bairds and Dalmellington in 1932. He left that firm in March 1940 to take up the position from which he now retires.

*Mr. W. G. Turnbull*

Formerly with Standard Telephones and Cables, Ltd., **Mr. T. F. Hargreaves,** B.Sc.(Eng.), A.M.I.E.E., has joined the Equipment Division of Mullard, Ltd., as a consultant on the overall planning of radio and telecommunication systems and to consider general applications of electronics. Mr. Hargreaves started with Standard Telephones and Cables, Ltd., in the Development Department in 1938, and was afterwards engaged on multi-channel carrier development and the design of carrier telephony circuits.

*Mr. T. F. Hargreaves*

To mark his retirement from the position of station superintendent at Ballylumford power station of the Electricity Board for Northern Ireland, **Mr. E. W. D. Elmer** was last week presented with a gold watch and a wallet of notes by Mr. T. G. Christie, chief engineer of the Board.

H.M. the Queen has awarded a Coronation medal for loyal service to the Crown, to **Lord Citrine,** chairman of the B.E.A., **Sir Henry Self** and **Sir John Hacking,** deputy chairmen, and to the other members of the Central Authority: (except for Mr. Tom Johnston who has been made a Companion of Honour), **Dame Caroline Haslett, Lt.-Col. F. H. E. Woodward, Councillor J. Sullivan, Mr. C. T. Melling, Mr. H. H. Mullens, Mr. H. Nimmo,** and **Mr. S. F. Steward,** and in addition, to **Mr. E. W. Bussey** who, until recently a full-time member responsible for labour relations and welfare, is now chairman of the employers' side of the negotiating machineries. Her Majesty has also made a similar award to **Mr. J. L. Brook,** who, apart from being a director of Brook Motors Ltd., is chairman of group 12 Hospital Management Committee and the hon. vice-president of the Yorkshire Branch of the Royal Society of St. George, in addition to being President of the Huddersfield branch of the Society.

The Minister of Fuel and Power has appointed **Mr. R. O. C. Hurst,** J.P., C.C., as deputy chairman of the Eastern Electricity Consultative Council in sucession to **Alderman S. C. Grimwade,** J.P., who has retired owing to ill-health.

At the annual general meeting of the Radio Industries Club, **Mr. Edward E. Rosen** was elected president in succession to Lord Brabazon of Tara. In addition, the following were elected vice-presidents: Messrs. **A. J. Dew, H. de A. Donisthorpe, A. J. P. Hytch** and **J. H. Williams.** The new chairman of the committee is **H. A. Curtis,** with **R. F. Payne-Gallwey** as vice-chairman.

Elliott Brothers (London) Ltd. announce that **Mr. C. Marcus, Mr. J. G. Beevor** and **Mr. E. C. O'Hanrahan** have been appointed directors.

The award of the M.B.E. to **Mr. J. H. Naylor,** A.M.I.E.E., district engineer at Barnsley to the Yorkshire Electricity Board, which we briefly noted last week, comes on the eve of his retirement after 50 years' service in the electricity supply industry. He retires in August. He has served throughout with the Barnsley undertaking after an apprenticeship with a local electrical concern. There followed a succession of promotions and prior to vesting day he was chief assistant to the borough electrical engineer.

*Mr. J. H. Naylor*

The British Thomson-Houston Co., Ltd., has appointed **Mr. R. W. M. MacAlpine,** A.M.I.E.E., Assoc.Amer.I.E.E., as assistant manager of the London district office. Educated at St. Lawrence College, Ramsgate, and at Regent Street "Poly," he became a graduate apprentice with B.T.H. at Rugby in 1926, and subsequently joined the staff of the Industrial Sales Department. After transfer to the Contract Department he was, in 1934, appointed to the company's export staff in London. Following war service he joined the staff of B.T.H. London district office where he was engaged on various contracts, and since 1948 has been chiefly concerned with heavy plant for the B.E.A.

*Mr. R. W. M. MacAlpine*

Founder of the Brighton electrical concern which bears his name, **Mr. Allen West** has retired from the company "to make way for a younger man," as he puts it. Being over 70 years of age, he declined to offer himself for re-election as a director of the company. He started his long career in the industry as a pupil of S. Z. de Ferranti, remaining with the company until 1899, when he volunteered for the South African war. Suffering wounds he was invalided back to Britain and was sent to a nursing home at Hove, where he met the lady who later became his wife—that is why the company is at Brighton. He started Allen West and Co., Ltd., there early in 1910, leasing part of the Reason Manufacturing Co.'s premises, and one of the first things designed was a finger contact for drum controllers, which was subsequently adopted by the Admiralty. With the rapid expansion of the company, Mr. Allen West was asked by the principal shareholders of the Reason Manufacturing Co. to take over that company, which he did in 1914. Mr. Allen West was also a founder member of B.E.A.M.A., and is still a member of the Council. His many friends throughout the industry will join in wishing him a long and happy retirement.

*Mr. Allen West*

**Mr. Gilbert F. Sargent,** late of Cyc-Arc Ltd., has been appointed buyer to K.D.G. Instruments Ltd. and Stow and Partners Ltd.

**Mr. R. J. Gunton** has been appointed as London manager to Clarkson (Engineers) Ltd.

District manager at Halesowen in the South Staffs and North Worcs sub-area of the Midlands Electricity Board, **Mr. R. P. Jones** is retiring after 43 years' service in the industry. He joined the former Shropshire, Worcestershire and Staffordshire Electric Power Co. in 1919, and was local district manager at Halesowen for the company for many years.

### OBITUARY

**Mr. H. P. Guy,** A.M.I.E.E., district manager at Barnet, Northmet sub-area of the Eastern Electricity Board, collapsed in his office on Monday last and died on admission to hospital. He had been district manager at Barnet since 1925, and was due to retire in September. He was 59.

**Brig. T. B. Hickman,** C.B.E., M.C., managing director of British Telecommunications Research, Ltd., died on June 4, aged 54. During the war he was seconded to the Ministry of Supply as Director of Telecommunications and Research.

**Mr. H. G. Barrett,** COMP.I.E.E., for many years manager for Scotland to the Simplex Electric Co. Ltd., died on May 30, aged 76.

**Mr. R. A. Deans,** manager of the Special Lamp Department of the British Thomson-Houston Co. Ltd., died on May 30, aged 60.

## ELECTRICITY—*A Power of Good*

THE problem of improving the load factor is one of the most important factors in the economics of electricity production and supply and investigations have been carried out by the B.E.A. and other bodies, into the effect of various types of domestic appliances on the peak and on the average load. One of these investigations was reported at length under the heading of "Immersion Heater Demand" in our issue of May 21.

Consequent on these researches it has been decided to induce more public attention to those appliances which can best aid the economic running of the industry. The two items principally affected are water heaters and cookers. The virtues of these equipments are being brought to public attention by means of a series of advertisements, produced by the Electrical Development Association and to appear in most of the leading periodicals, particularly those with an appeal to women, in this country.

As is usual a certain amount of back-up publicity will also be made available in the form of a booklet and display cards. We reproduce one of the advertisements below.

***"I'd never go back from Electricity to old-fashioned cooking now!"***

"THE oven's really big; with automatic temperature control. The boiling plates heat far quicker than I ever expected. The new variable switches give perfect heat control — from fast boiling to slow simmering, and even lower, if you want it!

One great thing about electric cooking is that it's so *clean!* No greasy, grimy walls, no fumes, no ash, no stains on my nice new kitchen paint. Curtains, now, don't need washing half as often.

When it comes to saving work, there's my electric water heater. No fires to light in the summer! The electricity people helped me choose exactly the right one — it gives me all the hot water I want and I'm saving on my bills."

**For friendly advice and information, go to your Electricity Showrooms or Service Centre. They will be glad to help you. They can also let you have details about easy payments.**

**ELECTRICITY**
***a Power of Good***

*"Everything keeps so clean with electric cooking; you can have flowers in the kitchen too."*

E.D.A./31

# *The* BUYER'S *Column*

## Slide Rule for Thread Data

AN extremely useful slide gauge has been produced by W. H. A. ROBERTSON AND CO., LTD., Lynton Works, Bedford, which will give a wealth of data necessary to designers and draughtsmen that is usually found only by reference to probably three or four handbooks.

Accurate information is provided by the rule because all data included confirms to the provisions of relative British, American, or Continental standards.

A sliding cursor gives thread system, major diameter, threads per inch and pitch in mm, and effective diameter for class 2 med. fit bolts, for British Standard Whitworth, all sizes up to 1½ in. diameter; British Standard Fine, up to 1 in. diameter (exc. $\frac{11}{16}$ in, $\frac{13}{16}$ in.); B.A., up to 10; System International, up to 36 mm diameter; American National Coarse and Fine and Unified Coarse and Fine, up to 1½ in. diameter. In addition, immediate conversion of inches to millimetres is obtained by taking readings at the top and bottom scales of the cursor, which are also, of course, scales for measurement.

The value of this ingenious gauge is exemplified by the speed in which answers can be found to such queries as the measurement of the part to be screwed, conversion of measurement between inches and mm; standard pitch/t.p.i. for the required diameter, whether a required pitch/t.p.i. is standard, whether another series includes the required t.p.i. (particularly useful for tangential dies), and maximum and minimum effective diameters for medium fit.

Easily carried in the pocket, the Wharco Threadata gauge is retailed at home and abroad through the firm's agents. The U.K. retail price is 3s. 9d., including directions for use.

## Price Reductions

REDUCTIONS in the price of the firm's entire range of door chimes are announced by MORPHY-RICHARDS, LTD., 121 Victoria Street, London, S.W.1.

Model B.220 now costs 32s. 6d., plus 11s. 11d. p. tax; TU.100 now costs 39s. 6d., plus 14s. 6d. p. tax; TB.101, 46s. 6d., plus 17s. 1d. p. tax. and T.C.110, 32s. 6d., plus 11s. 11d. p. tax.

These reductions come into force on July 1.

## Dexray present a Television Reflector

MOUNTED in a neat frame on a universally adjustable floor stand, the new "Cosy-View" television viewing reflector, just introduced by DEXRAY ENGINEERING CO., LTD., Brock Street, Lees Street, Manchester, comprises an optically-ground glass lens, covered with a special surface coating. It enables invalids or anyone sitting in any part of the room to view the programme without the need for moving furniture or making special seating arrangements.

It is claimed that the maximum enlargement in a normal size room is that the screen of a 12-in. tube T.V. receiver can be viewed in the form of a distortion-free "mirage" picture up to 20 in. in size.

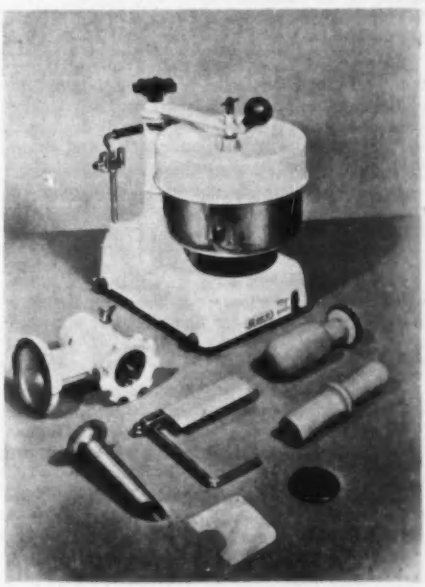
This T.V.R.2 viewing reflector, which retails at £3 17s. 6d., will be followed by several other patented sizes and types.

## H.M.V. now market a Food Mixer

THE H.M.V. Model F.M.2 food mixer has now been marketed by E.M.I. SALES AND SERVICE, LTD., Hayes, Middlesex. This is a modified version of the Lammix, which was formerly marketed by a subsidiary company of Huwood Components, Ltd.

The F.M.2 is a multi-purpose mixer with capacity of 6½ imperial quarts and has a range of specialised accessories, with the aid of which the machine will perform a variety of kitchen tasks such as grating, shredding, coffee grinding, juice extraction, liquefying and emulsifying, whisking, mincing, slicing and peeling, dough mixing and creaming.

The price of the basic model F.M.2, including mincer, is 39 guineas, but with all accessories, the price rises to £73 18s. We understand that h.p.



*The basic model F.M.2 H.M.V. mixer*

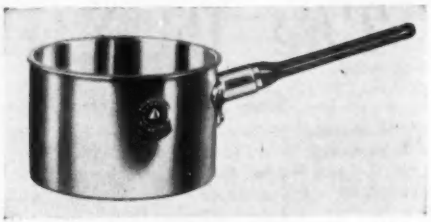
terms are available, smallest deposit being 13 guineas, and that it is backed up by a special service for owners of the machine, organised in conjunction with the Good Housekeeping Institute.

### The Drip Eliminated

HOUSEWIVES will be delighted by the news that one firm has now marketed a non-drip, easy-pour saucepan, which they claim *is* effective.

HAGUE AND MCKENZIE, LTD., Pyramid Works, Sloane Street, Birmingham 1, makers of Pyramid aluminium ware, have been carrying out experiments since 1946 in an attempt to produce a saucepan which would pour its contents effectively and completely into the desired receptacle without causing almost half of the contents to cover the kitchen cooker or working table.

To supersede the traditional "V"-shaped lip, the company produced a pan with a right-angle section lip, this however, was only effective as long as the liquid stream did not exceed the width of the lip. Now the firm have produced a pan equipped with a narrow-lipped rim right round the edge, which they claim is the answer to the problem. However fast the liquid is poured it is carried away from the side in a smooth and easily-controlled flow. When the pan is tilted back the stream instantly breaks and the residue remains in the pan.



*The Pyramid dripless pan*

# TRADE PUBLICATIONS

CHEMICALS IN PAINTING.—Leaflet MFD102 describes Detac, a preparation for heating water conditioned spray booths; Pultac, a strippable material for dry walls of paint spray booths, and Preperite which removes rust from iron and steel and corrosion from aluminium. Pyrene Co., Ltd., Great West Road, Brentford.

FANS.—Copies of a new four page leaflet issued by the London Fan and Motor Co., Ltd., 91a Burghley Road, Tufnell Park, London N.W.5, are now available.

LAMPS AND LIGHTING.—Part 3 of the Osram lamp catalogue has now been issued in a 21st edition by the General Electric Co., Ltd., Magnet House, Kingsway, London W.C.2. It deals with the photographic and projector lamps and photo-flash bulbs issued by the company.

ALUMINIUM SOLDERING.—"Kynal" solders and "Kynal" flux for soldering aluminium are featured in booklet by Imperial Chemical Industries, Ltd., Millbank, S.W.1.

CONTROL VALVES.—"Satchwell" modulating valves for high pressure hot water type PMHX and motorised valves for high pressure hot water type PMH are featured in lists 142 and 121 respectively.—Rheostatic Co., Ltd., Slough.

ACCESSORIES.—The new Coronation catalogue available from Nettle Accessories, Ltd., Harper Road, Wythenshawe, Manchester, gives details of all their products together with a few illustrations of the many trade mouldings the firm make.

RECTIFIERS.—A range of miniature h.t. selenium rectifiers has been developed by Standard Telephones and Cables, Ltd., Warwick Road, Boreham Wood, Herts. This range, which consists of three basic types of half-wave rectifiers, is described in a recent leaflet F/SRL9.

LIGHTING FITTINGS.—Galleries and accessories, three light pendant fittings and inexpensive flakestone bowls are described in three recent leaflets issued by T. B. Morley and Co., Ltd., Jameson St., Hull.

ALUMINIUM.—"Noral Sheet Products—Part 1," published by the Northern Aluminium Co., Ltd., Banbury, Oxfordshire, and giving size limits and manufacturing tolerances for the firm's sheet and plate, supersedes Section 3 of the Noral Handbook.

MOTOR STARTERS.—Leaflet No. 1370 describes type FDO flameproof direct-on 30 amp contactor starters produced by the company.—The Belmos Co., Ltd., Bellshill, Lanarkshire.

OIL-FILLED HEATERS.—The new Dimplex flameproof and gas-tight oil-filled electric radiators are described in a leaflet issued by Dimplex, Ltd., Totton, nr. Southampton, Hants.

ELECTRICAL INSTRUMENTS.—A 36-page comprehensive list (No. 163A) of instruments made by the Cambridge Instrument Co., Ltd., 13 Grosvenor Place, London S.W.1, has been reissued in a completely revised and up-to-date state.

SWITCHES.—A complete illustrated catalogue of switches and signal lamps, List No. 128, has now been published by Arcolectric Switches, Ltd., Central Avenue, West Molesey, Surrey.

APPLIANCES.—Domestic and Industrial Electrical Appliances are featured in Catalogue No. 617 now being issued to the trade by Drake and Gorham Wholesale, Ltd., 77 Long Acre, W.C.2.

LABORATORY EQUIPMENT.—"Raymond" laboratory mills, separators and pulverisers, are featured in a new booklet G.534 published by International Combustion, Ltd., 19 Woburn Place, London, W.C.1.

# The WEEK in NEWS

## Melbourne to Stage Electrical Show

### *October 1954 fixed to exhibit Australia's Work*

PLANS are now being laid to stage a large-scale Electrical and Radio Exhibition in Melbourne in October, 1954. This was announced at the beginning of the month by the president of the organising body, the Electrical and Radio Federation of Victoria, Mr. Alan Steward. It will be the first time since 1935 that the electrical industry will be on show in Australia on such a vast scale.

Although it is too early now to give many details of the exhibition it is hoped to make it representative of all branches of the industry, and to include among the exhibits all manner of equipment and appliances for radio, radar and television, domestic, industrial and civic lighting, household and commercial refrigeration, power supply and telecommunications. Primarily, of course, the exhibition will provide Australian manufacturers with an opportunity of showing their products, and particularly of demonstrating the results of their research. Overseas visitors will, however, be fully represented.

It is understood that among the highlights of the exhibition will be a section devoted to generation and distribution with detailed explanations of the Snowy Mountains project. Applications of atomic energy will also be prominent as well as street lighting, electronics and the use of electricity in transport.

## CANADA'S 1953 TRADE FAIR

CANADA'S sixth Trade Fair at Toronto, which closes tomorrow (Friday), has been the largest to be held. Over 230,000 sq ft of floor space was occupied, of which total, Canadian manufacturers booked over half. It is good to see that British firms are recognising the potentialities in this market and were the second largest group of exhibitors occupying some 55,000 sq ft. In the electrical section, U.K. manufacturers took 2,400 sq ft to show such equipment as generating sets, transformers, arc welding equipment, h.v. cables and electrical signs.

Among products making their debut in the Canadian market are electric motor controls produced especially for the country by a Hertfordshire company. Another U.K. manufacturer is exhibiting a new street lighting lantern housing five 67½ W cold cathode fluorescent tubes.

## Bermuda Conference

AN ADVANCE team of communication engineers has arrived in Bermuda to install additional equipment at Cable and Wireless Ltd.'s telegraph station there, which will handle the extra traffic caused by the Big Three Conference.

## 12,627 OVERSEAS BUYERS AT B.I.F.

READERS will probably recall the President of the Board of Trade's announcement that he had set up a committee to consider the future of the British Industries Fair. It may therefore be appropriate to consider the results of this year's Fair, especially from the attendance point of view. It is impossible to assess the value of business done, but some idea of the success may be gained from attendance figures. Most remarkable was the increase in public attendance, especially at Earls Court, where over 10,500 more people visited the Fair. At Olympia there was an increase of about 8,000, but at Birmingham a slight decrease due to a drop of 4,000 in organised work parties.

The total number of overseas buyers attending the three sections was 12,627, a drop of 600 on 1952. Home buyers totalled 75,728, a fall of 300 on last year. Under present conditions the figure of 12,627 overseas buyers is probably most important. Over a hundred territories were represented, and the largest contingent, came from Australia. The 1954 B.I.F. will take place between May 3 and 14.

### *The First Half-Century*

Among the month's activities is the Municipal Electrical Convention. This year no fewer than three papers will be presented by Chairmen of Committees, a refreshing change from last year, when the engineers monopolised the whole of the three days. Ald. J. P. Smith leads off with a paper on the "Statistics of Electrical Supply." The annual business meeting which winds up each Convention is generally a mere formality, but this year an item "Loans for Wiring and Motors" makes a welcome appearance on the agenda paper. If, as an outcome, the wiring contractors can be induced to see that the municipal electrical engineers want to do them good and not harm, then the Convention will have worthily crowned its labours.—*From our issue of June* 11, 1903.

## REPLY TO METER-READING ALLEGATIONS

A STATEMENT has been issued by the London Electricity Board in reply to implications published in the *Daily Worker* that the Board had abandoned their policy of improving the standard of work among meter readers by advertising vacancies. The Board has explained that in the past 18 months the number of readers has been reduced from 674 to the required figure of 475 in accordance with the policy of securing a fair day's work for a fair day's pay. The vacancies being advertised have arisen because of retirements and similar causes, while the cause of work falling into arrears in the past few months in many districts has been due to an abnormal amount of absenteeism. This latter is now being rectified, the Board stated.

## Policy Continued

TRADING policy introduced a year ago by Thorn Electrical Industries, Ltd., and Ekco-Ensign, Ltd., is to be continued without change until May 31, 1954. Main feature of the policy is the aggregated annual rebate on all purchases of the company's lamps, tubes, fittings and control gear.

## *Tariff Suggestions for S. Wales Consumers*

THERE have been many criticisms of the electricity tariffs in the S. Wales Area in recent months. It is one thing to criticise and quite another to offer an alternative, but the Consultative Council has now put forward proposals for a revision and is to send them to the Board. Main suggestion concerns the block tariff which at the present rate is 5d. a unit. It is proposed that the number of units to be paid for at the dearer rate should be fixed instead of allowing it to fluctuate with the number of rooms in the building, and that the charge for units in the primary block should be reduced.

The Council contended that the number-of-rooms basis was not an accurate estimation either of consumption or of the income groups of consumers. Modern houses with few rooms were usually better equipped than larger and older premises often occupied by poorer people. It was calculated that persons in houses of average size would be unaffected, those in smaller homes would pay a little more and those in larger houses less. The Council were also of the opinion that about 20% of consumers used less than 200 units a year and never benefited from the reduced charges at ·85d. per unit. Financially, the Council states, the recommendations would involve a reduction in the Board's revenue and they are enquiring as to whether this could be met.

Allocation of capital to the Board for 1953-54 was £3,100,000—£850,000 above last year, but £130,000 below the minimum estimate. The sum of £310,000 has been scheduled for rural development.

### OFFICIAL PUBLICATIONS

BRITISH STANDARDS. B.S. 1980: Portable Electric Hand-lamp (open type with protective guard).

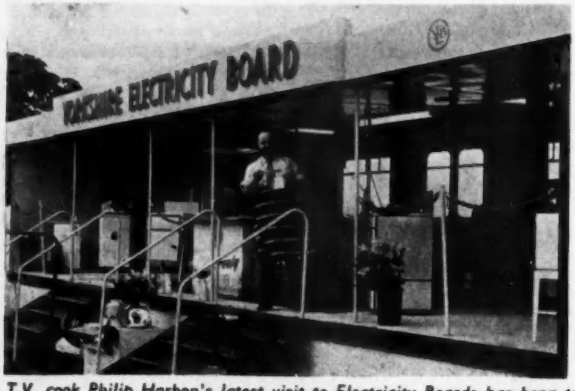
## More Trams to be Scrapped

WE have received progress reports this week from Liverpool and Leeds on their conversion of tram routes to motor bus operation. Last Sunday 46 buses took over the Liverpool-Garston routes previously served by the same number of trams. This changeover marks the completion of another stage in the transformation, as now the whole of the southern part of the city is being served by buses.

Proposals for replacing two tram routes in Leeds are being considered by the Transport Committee. The routes involve about six miles of track and represent the first stage in a plan to discard the whole of the city's tramway system. At the same time two new experimental single-deck rail cars went into service last week. Since June 1 these cars—one is all-electric—have been operating free Coronation rides on all the City's tram routes.

## Marine Engineering

An example of British marine engineering potentiality is provided by a set of statistics which reached us last week showing Richardsons Westgarth and Associated Companies' work between 1945 and 1953. During that time the group supplied and installed complete propelling machinery installations in 240 vessels.




*T.V. cook Philip Harben's latest visit to Electricity Boards has been to Yorkshire, where he gave a series of demonstrations of milk dishes on the Board's stand at the Bradford Agricultural Society Show. The mobile and extendable trailer, used by the Board to tour rural districts, was fitted up as a kitchen for the occasion*

## E.T.U. RESIDENTIAL COLLEGE OPENED

THE first residential college possessed by any union in Britain—the Electrical Trades Union's new venture at Esher Place, Surrey—was formally opened by Mr. F. Foulkes, the president, last Thursday. There the Union is to start a series of 6-day courses for about 30 branch officials and shop stewards, with the principal intention of educating them in matters connected with administration and negotiations. The first course—for shop stewards in the Electricity Supply Industry—starts on June 21. Esher Place, which has many historic associations, was formerly owned by Shaftesbury Homes and used as a training school for girls. It has 48 rooms, including a library, billiard room, and a museum housing many of the Union's early documents. For this latest venture, the E.T.U. is allocating about £20,000 a year, apart from the purchase of the building and the extensive decoration and furnishing. The new electrical work involved was carried out by C. W. Gosling.

## P.O.A. Still Growing

BECAUSE of continuing expansion, the Purchasing Officers Association has now taken over the remainder of the first floor offices at Wardrobe Court in Queen Victoria Street, London. Head office accommodation became increasingly cramped as further branches and groups were formed. The Association now has 40 branches and groups scattered in most of the large towns in the U.K., as well as those in Australia and S. Africa.

## Model Plane Hits Cable

A NASTY accident occurred recently at Leicester. A model plane being flown by a 15-year-old boy struck an overhead line carrying 132 kV and sent the current down the control wire. The boy later died in hospital from shock following severe burns, it was stated at the subsequent inquest.

*The Electrical Trades Union's new residential college at Esher*

## *The Institute of Physics during 1952*

DURING 1952 there was a record number of admissions to the higher grades of membership of the Institute of Physics. This is revealed in the thirty-third annual report of the Institute, which was adopted at the recent A.G.M. At the end of the year the total membership of the Institute was 4,347.

Another notable facet of the year's work was the advance made in the plans for publications. These included more volumes in the Institute's "Physics in Industry" series and preparations for launching a new series of "Monographs for Students," for undergraduates or H.N.C. students.

Once again the Institute has been active at national level in affairs affecting physicists. It has discussed with the Factory Department protection from radiation in radiology, served through representatives on B.S.I. committees, negotiated with an insurance company on whether "research physics" entailed an occupational hazard and has secured deferment of the call-up of students reading for the Institute's graduateship examination.

## Tranquil Dale for Peace and Quiet

THOSE in the electrical industry who, in the future, need a period of rest and convalescence in the country, and gain the assistance of the E.I.B.A., may be fortunate enough to spend a time at Broome Park. The bungalow there, named Bedford Cottage, has been given to E.I.B.A. by the Electrical Contractors Association. Mr. Hamlyn Drake, president of E.I.B.A. accepted the gift from the E.C.A. president Mr. W. T. Trace. Broome Park is situated in a Surrey valley and was, at one time, appropriately named Tranquil Dale.

## *LUMA SALES*

ANNUAL report of the British Luma Co-operative Electric Lamps Society referred to the continuous upward trend in the sales of British Luma due to the support of the retail societies. The chairman emphasised, however, that the support would have to be maintained and increased before they could be satisfied with the position attained. Thanks were expressed to two British wholesale societies for their assistance. and also to the Swedish Luma for technical advice.

## B.E.P.C. Exhibition

On page 1041 of last week's issue, in the article under this heading, the illustration of

Backer Electric Co.'s heating element is that of their twin-circuit washing machine element, and on page 1048 Messrs. Nettle Accessories Ltd. were erroneously described as Little Accessories.

## *Sales of Appliances since the Budget*

A SHORT review of the present position concerning sales of domestic electrical appliances, as they have been influenced by last April's Budget, appeared in last Friday's edition of the *Financial Times*. Since April, it was stated, sales, especially of refrigerators, washing machines and vacuum cleaners, have shown a general upward trend. Some comments attributed to prominent manufacturers of these appliances indicated a remarkable increase, but the general opinion expressed appeared to be that there had been a comparatively slight improvement. This, like the cut in purchase tax, was claimed to be too small to affect the position of the industry generally. One reason given for the lack of any phenomenal increase in sales, was that much of the money which might have been spent on these appliances went on television sets prior to the Coronation. Other points which should be borne in mind are that sales have also been encouraged by coincidental cuts in prices by relevant manufacturers, and as far as refrigerators are concerned, the sales increase has come at the beginning of the usual seasonal rise. The report also mentions that price reductions which have been carried out may well be the last, and manufacturers will now look to improvements in design and efficiency for further inducements.

The domestic appliance industry is also urging an easement in the hire purchase restrictions imposed last February, and consider that to be a better fillip to sales. On the export side, the industry is reported to be holding its own, with special concentration on expanding Far Eastern markets.

## Salesmen Confer

A SERIES of sales conferences have been held in London recently by the Eastern Electricity Board. Object was to review the Board's past and present sales policy and discuss methods of improving the volume of sales and contracting business. One-day conferences for sub-area managers, sub-area commercial officers and district commercial engineers, were followed by two-day meetings of service centre supervisors and senior assistants. The latter included talks on such subjects as "Trading Policy," "Standard Tariffs," "Merchandising and Contracting," and "Publicity Programme for 1953."

*This display will be familiar to the many delegates attending the B.E.P.C. this week. It is in the window of the Torquay Electricity service centre where Simplex Electric have provided an attractive show of cookers with a coronation motif. The same company has also provided displays in the window of T. L. Harding and Sons, Ltd., Market Street, and C. Buswells and Sons, Ltd., Union Street*

## ELECTRICITY FROM OLD WATERMILLS

A SUGGESTION has been made to the Ministry of Fuel and Power that old and disused watermills, scattered throughout Britain, might be put to good use in generating electricity. A register of these mills is now being compiled by the Society for the Protection of Ancient Buildings, who have made the suggestion, and as a preliminary step the Ministry has been furnished with a list of 12 mills, mostly in Yorkshire and the Midlands, which it is thought could be suitably adapted to supplement power supplies. It is understood that the Government department is examining the possibilities. One estimate of the cost is that the average mill could be converted for an outlay of £1,000. It has also been calculated that a return of about £7 a week could be expected.

## Wet Leaf Proved Fatal

DAMAGES amounting to £2,250 were awarded last week to the widow and son of an Eastern Electricity Board employee who pointed to a supposed fault in an electric cable with a wet dandelion leaf. It was stated that the man was making a test and the insulation had been stripped from the wires. He pointed to where he thought the fault was with a wet leaf and was electrocuted.

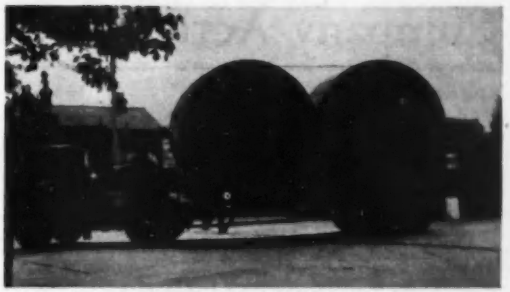
## *Orders Placed*

INFORMATION concerning two orders placed with U.K. manufacturers reached us last week. The first concerns one placed by the U.S. Army authorities in Europe worth £267,000. It was for generating plant to be used with radar sets and has been given to R. A. Lister and Co., Ltd.

The other involves the S. Wales Div. of the N.C.B. who gave an order to Brush Bagnall Traction Ltd., for two 400 h.p. Diesel-electric shunting locomotives. Main and auxiliary generators, traction motors and control gear will be Brush electrical equipment.

## 301kV CABLE FOR CANADA

*Two of about nine drums of 301 kV oil-filled cable leaving the Eastleigh works of Pirelli-General Cable Works Ltd. en route to the Aluminium Co. of Canada Ltd. for an underground cable installation of 750 yd. comprising some 2,000 yd. of cable. These cables will transmit power from hydro-electric generators in a power-house excavated in the interior of a mountain at Kamano, British Columbia. They will be laid through a tunnel leading to a mountain slope terminal whence power will be conveyed by overhead line to an aluminium smelting plant at Kitimat*



# NEWS IN BRIEF

S.E. Division of Smoke Abatement Society has decided to establish its own Divisional Council. Previous Councils, set up in Scotland, the N.W., N.E., Yorkshire, and two in the Midlands have proved successful.

John Thompson Ltd.'s Supervisors' Association held its third annual conference at Blackpool earlier this month.

Presidential address by Mr. S. C. Tyrrell of the Instititute of Cost and Works Accountants has been published in pamphlet form.

Fluorescent fittings and dimmer control gear for colour floodlighting in fountains and gardens in Russell Sq., London, were supplied by Thorn Electrical Industries, Ltd.

The Royal Photographic Society's centenary exhibition of Colour Photography is now being held at 16 Princes Gate, S.W.7. It will remain open until July 25.

Course of four lectures on "Solid-State Electronics" will be given by Dr. Karl K. Darrow of Bell Telephone Laboratories, New York, at King's College (University of London) between June 22 and 26.

Annual Court of Governors of Royal Commercial Travellers' Schools will be held at St. Ermins, Caxton Street, Westminster, on June 12.

Second post-war exhibition of the German radio and gramophone industry will again take place at Dusseldorf between August 29 and September 6.

S.E. Electricity Board have provisionally fixed May 10, 1954, for their next meeting with manufacturers' representatives.

The housewife of Amal, Sweden, who bought a lucky Hoover washing machine, and the wife of the dealer who sold it, won a free trip to London arriving on May 30—in time to see the Coronation.

Official opening of first instalment of the Peterborough Technical College has been arranged for October 1. Ceremony will be performed by Rt. Hon. the Lord Perry of Newcastle.

Large-screen television was shown to over 6,000 viewers in two of Birmingham's main public buildings on Coronation day. Seven 4 ft by 3 ft screen projection sets were provided by Hadley Bros. (Radio and Electric) Ltd. and Philips Electrical Ltd.

A Building Today Exhibition is to be held at Portsmouth Municipal College between June 23 and 27.

Merseyside Board at Northwich received an S O S at 1 p.m. one day to cope with feeding a litter of 15 piglets. By 2.30 p.m. an electric foster mother had been installed, and all was well. A record?

Annual report of the Aluminium Development Association for 1952 shows continuing progress. Particular attention was called to long-term development and investigations in structural engineering, large riveted joints, welding and finishing.

*Our photograph shows Uskmouth power station's second 60MW stator passing over St. John's Bridge, Tewkesbury, on its way from the G.E.C.'s Witton Works, Birmingham. The equipment weighed 104 tons and was one of six destined for Uskmouth. The transportation is interesting because the trailer used was, at the same time, undergoing a test before being shipped to Australia. It was made by Cranes (Dereham), Ltd., and on arrival in Australia will asssist the Snowy Mountains Hydro-Electric Authority*

# Company Activities . . .

**Aberdare Electric Co. Ltd.**

An issue of 1,400,000 Ordinary shares of 5s. each will shortly be made to finance the steel wire project carried on by a new totally owned subsidiary, Ferrodare, Ltd. As a preliminary, the authorised capital has been increased from £400,000 to £750,000. The new shares will rank in all respects *pari passu* with the existing Ordinary and "A" Ordinary shares.

**Automatic Telephone and Electric Co.**

An indication of the expanded turnover of this company is the over £1,000,000 increase in the value of stocks at December 31 last at £5,728,971. Sir Alexander Roger, the chairman, also refers to the increase of £779,013 in debtors and bills receivable, demonstrating the large amount of working capital which must be provided to finance the firm's type of capital equipment.

| Year to Dec.31 | £ Trading Profit | £ Net Profit * | % on Ord. Earn'd | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1948 | 983,400 | 341,020 | 55 | 12½ | 67/- | 59/- |
| 1949 | 1,385,101 | 627,779 | 85 | 12½ | 65/6 | 50/- |
| 1950 | 1,664,229 | 741,507 | 100 | 15 | 63/3 | 51/6 |
| 1951 | 1,679,067 | 711,350 | 89 | 15 | 74/9 | 61/3 |
| 1952 | 1,281,261 | 538,763 | 52† | 15 | 62/2 | 50/3 |

* Available for the parent company†. On larger capital.

**Barton and Sons Ltd.**

The change to buyer's market during the latter half of 1952 prevented these manufacturers of tubing and conduit from equalling their previous year's record profits. Mr. A. H. Redfern, the chairman, also reports that their increased capacity has not been fully employed due to a slackening in demand in some lines. The balance sheet shows that investments, at £388,438, are £32,493 higher than for the previous year, which is mainly accounted by the investment in a Canadian company which commenced production of electrically welded tubes in Canada last August.

| Year to Dec.31 | £ Trading Profit | £ Net Profit | % on Ord. Earn'd | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1948 | 330,391 | 102,780 | 41 | 7 | 6/10 | 5/3 |
| 1949 | 372,066 | 115,209 | 47 | 10 | 6/6 | 4/7 |
| 1950 | 494,314 | 161,278 | 66 | 12½ | 8/- | 5/3 |
| 1951 | 772,813 | 292,742 | 133 | 15 | 11/5 | 7/4 |
| 1952 | 695,888 | 223,350 | 77 | 15* | 9/11 | 7/10 |

* Plus 25% capital bonus.

**Lancashire Dynamo Holdings, Ltd.**

Record outputs were achieved in 1952 by the L.D.C. works at Trafford Park and Willesden, as did the Wimbledon works of Foster Transformers, Mr. H. W. Bosworth the chairman, points out, The Nevelin Electric Co. and Lancashire Dynamo Electronic Products made notable progress, output and profit of the former being a record, he adds. But Mr. Bosworth also warns of the marked falling off in demand in all parts of the world and of the increase in competition. The heavy backlog of orders with which the company starts the year should ensure reasonable results for 1953.

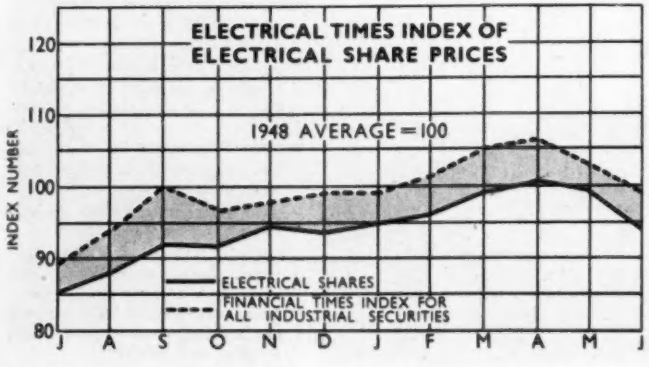
| Year to Dec 31 | £ Trading Profit | £ Net Profit | % on Ord. Earn'd | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1948 | 380,206 | 138,106 | 52 | 22½ | 6 | 4⅜ |
| 1949 | 396,501 | 150,040 | 54 | 22½ | 5½ | 91/- |
| 1950 | 492,229 | 176,859 | 56 | 22½ | 99/- | 90/- |
| 1951 | 578,589 | 203,157 | 33 | 12½* | 56/3 | 42/1 |
| 1952 | 599,556 | 200,531 | 31 | 12½ | 44/6 | 37/6 |

* Plus 100% capital bonus.

**London Electric Wire Co. and Smiths**

The further increase in the trading profit for 1952 is an obvious indication of the continued expansion of this company's business. The reduction in the net profit is due to taxation

| Year to Dec.31 | £ Trading Profit | £ Net Profit | % on Ord. Earn'd | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1950 | 928,408 | 304,210 | 62 | 10 | 53/9 | 42/- |
| 1951 | 1,395,741 | 520,461 | 96 | 12½ | 55/3 | 42/6 |
| 1952 | 1,518,265 | 520,580 | 92 | 15 | 52/6 | 36/6 |




*Share price indices last month regained roughly the same level as in January before they began their most recent rise. Most marked decline was in electrical share prices, which, as shown by the "Electrical Times," fell from 99·5 to 94·7. The Financial Times index for all industrial shares fell by 3·7 to 99·1 during May. Figures are based on average prices ruling in 1948.*

absorbing an additional £100,000. Increased current assets too, are due chiefly to stock-in-trade at £2,277,014, being some £362,000 above the previous year's total, although debtors are also about £150,000 higher.

**Venner Ltd.**

The dividend for 1952 is 15%, the same as for the previous year. The net profit, before taxation, amounts to £73,902 compared with £66,694 for 1951.

**Allen West and Co.**

Turnover for the year ended January 31 last was the greatest both in value and quantity that

| Year to Jan.31 | £ Trading Profit | £ Net Profit | % on Ord. Earn'd | % on Ord. Paid | Ord. Price High | Ord. Price Low |
|---|---|---|---|---|---|---|
| 1949 | 714,766 | 248,022 | 74 | 10 | 7/8 | 6/1 |
| 1950 | 734,414 | 283,537 | 53 | 10* | 10/9 | 6/9 |
| 1951 | 706,835 | 254,664 | 50 | 12½ | 14/5 | 10/6 |
| 1952 | 951,980 | 296,870 | 58 | 15 | 12/- | 8/3 |
| 1953 | 1,068,366 | 428,818 | 67 | 15† | 12/1 | 10/3 |

* Plus 60% capital bonus. † On larger capital.

the company has ever enjoyed, and included increased exports, Mr. W. H. Lancaster, the chairman, states. But while he reports that the order book is good, orders are not nearly so easily obtained, with defence work subject to sudden and unpredictable revisions and cancellations, he adds.

**B. S. and W. Whiteley**

This company is again paying a dividend of 30% for the year ended March 31 last. The group net profit for that period is £86,788 compared with £92,812 for the previous twelve months.

**Dividends Declared**

*Crompton Parkinson Ltd.* Interim Ordinary dividend of 5% (3¾%).

*S. Smith and Sons (England) Ltd.* Interim of 2½% (same).

*Telephone Manfg. Co.* Final of 7½% on increased capital, again making a total of 10% for the year.

# Electric Supply News . . .

**Burton-on-Trent**

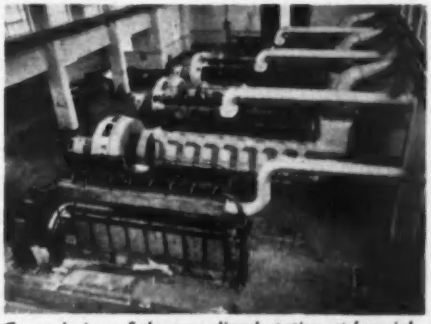
The public inquiry into the proposal of the B.E.A. to establish a generating station at Willington—the largest the Authority have so far contemplated—took place at Burton recently. The Authority propose to erect a station with a capacity of 400 MW initially, but the site was such that it would be possible to extend it to 800 MW, it was stated. The objectors included the Trent River Board, Derby Corporation, Repton School governors, and a number of farmers, part of whose land it was proposed to acquire for the project. Derby Corporation maintained the station would affect their airport, but for the B.E.A. it was stated that the Ministry of Civil Aviation had given a clearance in respect of danger to planes subject to necessary warning lights being fitted to chimneys. The school governors felt that the effect of the station would be disastrous, while the farmers declared that they would lose the best parts of their land. The alternative suggested was that the Drakelow and Castle Donington stations should be further expanded. Mr. F. H. S. Brown, deputy generation design engineer to the Authority, said the proposed station would have two cooling towers fitted with apparatus which would eliminate drizzle. An alternative site at Twyford was technically inferior and would involve additional costs, he maintained. Sir John Hacking, deputy chairman (operation) B.E.A., had earlier stated that atomic power was not likely in the near future to supersede coal power and, indeed, was likely to be used only to supplement coal reserves. In his view coal-fired steam generating plants would remain the backbone of British industry for much longer than the life of the Willington power station. The inquiry was concluded.

**Perthshire**

The North of Scotland Hydro-Electric Board's new Gaur power station at Rannoch, Perthshire, is to be formally inaugurated on June 20 by Mr. R. G. Menzies, Prime Minister of Australia (the station is in the ancient lands of the Clan Menzies). The Gaur scheme, which will generate about 17 million units annually, has a power station with one 6,000 kW set on the River Gaur, and a 50 ft dam at the outlet to Loch Eigheach.

**Retford**

The Town Council has now approved proposals of the East Midlands Electricity Board for the laying underground the existing o.h. line across Hallcroft Road playing field. The continuance of the line in the fields on either side is to remain overhead.



*General view of the new diesel station at Lerwick, of the North of Scotland Hydro-Electric Board, the formal opening of which we noted last week*

# Commercial Information

## CONTRACTS OPEN

### HOME

**June 12.—Aberdeen.** Electrical work in erection of school at Ballater. G. Bennett Mitchell and Son, architects, 1 West Craibstone St., Bon Accord Sq.

**June 13.—Edinburgh T.C.** Electrical installation in new Portobello fire station, City Architect's Office, City Chambers.

**June 13.—Salford T.C.** Supply of three refrigerators of 7 to 10 cu. ft capacity and two of 15 cu. ft capacity. Street Lighting Superintendent, 9, Frederick Rd., Pendleton, Salford 6.

**June 15.—Hamilton T.C.** Electrical work in erection of old people's home in Townhead St. Apply by above date to J. Kelly, Town Clerk, The Town House.

**June 16.—Northern Ireland.** Electrical installation in 32 dwellings at Castlereagh for N.I. Housing Trust, 12 Hope St., Belfast. Deposit 10s.

**June 18.—Merthyr Tydfil T.C.** Provision of electrical installations and rewiring; wiring to be with vulcanised india rubber cables, drawn into steel conduits, with necessary fittings, switches, etc., in seven schools and Dowlais branch library. Borough Engineer's Dept., Town Hall. Deposit £3 3s. (Advertised in this issue.)

**June 19.—Belfast.** Supply, erection, etc., of 110 kV and 33 kV main cables, auxiliary cables, etc., for Municipal power station to Donegall substation (N.1235), and 33 kV main cables and accessories for Stage 2 of 33 kV distribution system (N.1236). Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne Deposit £5 5s. (See May 7 issue.)

**June 20.—Limerick.** Electrical installations in additions, etc., at Mental Hospital. Consulting engineer, Nicholas Mathews, 42 Fitzwilliam Place, Dublin. Deposit £10 10s.

**June 24.—Windsor T.C.** Electrical installation in 50 houses on Manor Farm site. Borough Engineer, Kipling Memorial Building.

**June 27.—Leven T.C.** Installation of 140 W sodium discharge street lighting along trunk road A.915 for about one mile. Burgh Surveyor, Carberry Hse.

**June 29.—Failsworth U.D.C.** Supply and erection of 80 street-lighting columns in group A, with sodium lamps, lanterns and all auxiliary equipment. Engineer and Surveyor, Town Hall. Deposit £2 2s.

**June 29.—Litherland U.D.C.** Supply and installation of lanterns, sodium lamps, control gear and concrete columns in class A, along Bridge Rd. Engineer and Surveyor, Town Hall, Liverpool 21. Deposit £1 1s. (Advertised in this issue.)

**June 29.—Manchester.** Electrical installation (phase 2) at Queens Rd. 'Bus Garage. City Architect, Town Hall. Deposit £1 1s. (See June 4 issue.)

**June 30.—Ashbourne U.D.C.** Supply and erection of 114 150 W tungsten lamps and standards for stage 2 of public lighting scheme. Engineer and Surveyor, King Edward St. Deposit £1 1s. (See May 28 issue.)

**June 30.—Dagenham T.C.** Supply and erection of 42 group A lighting units along London-Tilbury trunk road. Borough Engineer and Surveyor, Civic Centre.

**June 30.—Grimsby T.C.** Electrical installation in erection of Western primary junior school at Broadway, Littlecoates. J. V. Oldfield, Borough Engineer and Surveyor, Municipal Offices, Town Hall Sq. Deposit £5.

**June 30.—Manchester T.C.** Electrical installation in 46 police houses on 13 sites. Director of Housing, Town Hall.

**July 6.—Bentley-with-Arksey U.D.C.** Supply of lanterns, lamps and control gear, provision of underground cable, and supply and erection of columns and fitting and wiring of equipment for sodium lighting along two miles of Gt. North Road. Engineer and Surveyor, Council Offices, Cooke St. Deposit £2 2s. (Advertised in this issue.)

**July 7.—Fife.** Electrical work in erection of new high school at Buckhaven. Frank W. Raynes and Son, Consulting Engineers, 40 Second Ave., Cathcart, Glasgow.

**July 11.—Southport T.C.** Installation of electric lighting and heating in 8 shops and 8 maisonnettes on Heathfield Rd. estate. Borough Architect, 93-105 Lord St. Deposit £1 1s.

**July 13.—Bromley (Kent) T.C.** Group A street lighting improvement scheme in four roads, involving re-erecting of existing columns and fixing 38 140 W sodium lanterns. Borough engineer, Municipal Offices, Bromley, Kent. Deposit £2 2s. (Advertised in this issue.)

**July 17.—Manchester.** N.W. Div. of B.E.A. invite tenders for repairs to hyperbolic cooling towers at Stuart St. power station. Divisional Secretary, 825 Wilmslow Rd., Manchester 20. Deposit £2 2s.

**July 21.—Waterford.** Supply and erection of pumps and electric motors suitable for 380 V, 3-phase a.c. supply for Tramore water supply scheme. Engineer, Council's Offices, Davitt's Quay, Dungarvan. Deposit £1 1s.

**No date stated.—Hastings T.C.** Electrical installation in 53 dwellings on Gate Town estate and adjoining sites. Borough Engineer, 37 Wellington Sq. Deposit £2 2s.

### OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

**July 1.—Australia.** Supply maintenance, etc., of 6,600 V switchgear, and accessories, metal-clad or outdoor kiosk type, for State Electricity Commission of Victoria, 22-32 William St., Melbourne. (Spec. No. 52-53/49). B.o.T. (Ref., CRE 18265/53).*

**July 2.—South Africa.** Stores Dept. of S. African Railways require supply of electrical railway signalling material, including lightning arresters, fuse bases, condensers, detectors and transformers. Tender Board P.O. Box 7784, Johannesburg. B.o.T. (Ref: CRE 19206/53)*

**July 6.—Formosa.** Central Trust of China requires supply of five portable electric tools,

100 soldering irons and three recorder reproducers. U.S. Aid Div. of Trust is at 96 Po Ai Rd., Taipei, Taiwan. B.o.T. (Ref: CRE 18961/53)*

**July 7.—South Africa.** Supply of 2,000 brass condenser tubes to various requirements for S. African Railways. Tender No. B.6539. Chief Stores Superintendent, P.O. Box 8617, Johannesburg. B.o.T. (Ref.: CRE 19203/53).*

**July 10.—Uruguay.** Usinas Electricas y los Telefonos del Estado requires supply of material, including bus bars, insulators, disconnecting blades, automatic interruptors, relays, etc., for transformer stations of 30/6 kV 50 c/s. Tender No. 3867/53. Spec. 2187. B.o.T. (Ref., CRE 18575/53).*

**July 15.—Formosa.** Supply of a motor-generator set, direct coupled, d.c., 10V, 1,000 A with resistance panels and control equipment, etc., for Central Trust of China, U.S. Aid Div., 96 Po Ai Rd., Taipei, Taiwan. (Invitation No. 218-D). B.o.T. (Ref.: CRE 18936/53).*

**July 15.—New Zealand.** Dunedin's Electricity Dept. invites tenders for supply of tension and suspension insulator sets for 110 kV transmission line. Documents from City Electrical Engineer, P.o. Box 513, Dunedin B.o.T. (Ref: CRE 19270/53)*

**July 16.—South Africa.** Supply, erection, etc., of plant, including clinker and fine ash paddle extraction equipment, ash and dust belt conveyors and skip hoist, with necessary chutes, hoppers and equipment to handle ash from each of six boiler units. Documents available from Head Office, Electricity Dept., Johannesburg. Plant is for Kelvin power station. Contract CK-8-Tender N.1276.

**July 17.—South Africa.** Supply of two 15,000 kVA three-phase automatic on-load tap-changing transformers for City of Durban Electricity Dept. Normal voltage ratio at no load 33,000/6,600 V. Town Clerk, Municipal Buildings. B.o.T. (Ref: CRE 19129/53)*

**July 29.—Australia.** State Electricity Commission of Queensland invites tenders (Spec. no. 372) for supply, maintenance, etc., of 11 kV metal-clad compound filled switchgear for new Townsville power station. Commission is at Scottish Union Hse., Eagle St., Brisbane. Copy of spec. at £1 1s. B.o.T. (Ref., CRE 18291/53).*

**July 30.—Tangier.** Water and Electricity Board invites tenders for supply of fluorescent street-lighting equipment for Plateau du Marshan. Documents (Frs. 2,000) from the Board at 4 rue Vermeer. B.o.T. (Ref., CRE 17921/53).*

**Aug. 14.—Australia.** Supply of 1,200 bracket type mounting and 300 suspension type mounting street lighting lanterns suitable for 100/200 W incandescent lamps. Former with asymmetrical refractors at 160% and latter with symmetrical refractors. Chief Engineer and Manager, Dept. of Electricity, Kelvin House, Adelaide St., Brisbane. Specifications at 10s. 6d. a copy.

**Aug. 20.—India.** Bombay Electric Supply and Transport Undertaking invites tenders (spec. no. E.S. 104/53) for supply of 22 kV and 6·6 kV switchgear and accessories for main receiving stations at Grant Rd. and Apollo. B.o.T (Ref., CRE 18201/53).*

**Sept. 15.—New Zealand.** Supply of four single-phase, 110 kV current limiting reactors, each of 13,333 kVA-through capacity, outdoor type, oil-immersed, self cooled (under contract no. 229) for Arapuni power station. Documents at Office of N.Z. High Commissioner, Adelphi Buildings John Adam St., London W.C.2.

**Sept. 29.—New Zealand.** Supply of 1,119 galvanised steel transmission line towers for Roxburgh-Islington 220 kV No. 2 line, for Christchurch district of State Hydro-Electric Dept. Specifications available from N.Z. Govt. offices in London. Amount of deposit, £100; and of bond £30,000.

## CONTRACTS PLACED

**B.E.A.** Circulating water intake works at Hackney, John Morgan (London), Ltd.; Two 30,000 kW condensing plants at E. Yelland, G. and J. Weir, Ltd.; 3.3 kV 100 MVA oil-break and 415 V switchgear and accessories at Goldington, A. Reyrolle and Co. Ltd.; 3,300 V indoor airbreak auxiliary switchgear at Castle Donington, British Thomson-Houston Co. Ltd.; Two 150,000 lb/hr stoker

## *Your Queries — Answered*

**"Foremost" floor polishers,** repairers of? E.E.—Try: Arte Electric, 318 King St., W.6; Southern Electrical Co., 6 Laings Corner, London Rd., Mitcham; Southern Electrics, 35 Newlands, Wallington. (22993)

**Small size, up to 2 in., electrically-operated gate valves for pressures to 200 lb p.s.i.,** makers of? A.W.—British Thermostat Co., Ltd., Windmill Rd., Sunbury-on-Thames; Igranic Electric Co., Ltd., 191 Victoria St., S.W.1. (22999)

**"Blow" butter churns,** makers of? S.R.—J. J. Blow, Ltd., Oldfield Works, Chesterfield. (23006)

**"Duplex" organ blowers, made by C. Dain, Ltd.,** address for? E.M.—These were taken over many years ago by: Wm. Hill and Sons and Norman Beard, Ltd., Manor Works, 71 High St., Hornsey, N.8. (23016)

**Concentric Mfg. Co., Ltd.,** address for? P.S.—Tyburn Rd., Birmingham 24. (23023)

**Firm supplying creosoted poles with a name similar to Burton,** address for? E.E.—We presume this refers to Burt, Boulton and Haywood, Ltd., Brettenham House, Lancaster Place, W.C.2. (23031)

**"Prilect" irons,** makers of? S. H.—T. Price and Son (Stampers), Ltd., Spring Hill Passage, Birmingham 18. (23039)

*The above are selected from questions we have answered this week. If you have a query, send it to us.*

### ANSWER WANTED

**Portable immersion heater, 1 ft in length, marked 'Lyko," D in circle and YP in a diamond,** makers of? E.B. (23046)

fired boilers at Northampton, Bennis Combustion, Ltd.; One 100,000 kW turbo-generator, feed heating and condensing plant at Ferrybridge "B", C. A. Parsons and Co., Ltd.; Main and auxiliary cables at Keadby, W. T. Henley's Telegraph Works Co. Ltd.; Three 305,000 lb/hr boilers at Huncoat, Simon-Carves, Ltd.; 66 kV 11 kV, 6,600 V and auxiliary cables at, Grove and Lodge Rds. substations, British Insulated Callender's Cables, Ltd.; 132 kV double circuit line between Eynsham and Yanton, W. T. Henley's Telegraph Works Co. Ltd.; 132 kV overhead lines from Marchwood to Nursling, W. T Henley's Telegraph Works Co., Ltd.; 132 kV overhead line between Castle Donington and Leicester, Riley and Neate, Ltd.; 132 kV double circuit overhead line from Castle Donington to Toton, Riley and Neate Ltd.; 132 kV double circuit overhead line between Daventry and Rugby, Riley and Neate, Ltd.

**Hyde T.C.** Supply and erection of 88 sodium and 7 fluorescent lighting points along Manchester and Mottram Rds., Metropolitan Vickers Electrical Co., Ltd.

**Scarborough T.C.** Electrical repair work at North Bay, J. G. Appleyard, £1,426.

**Worcester T.C.** Electrical installation in the Guildhall, Abell and Smith Electrical Co., Ltd., £1,679.

## TRADE MARKS

*This information is extracted from the Official Journal by permission of the Controller.*

**Mercury Electric Motors** in design. 714,058. Class 7. Mercury Home Trade Co. Ltd., 36/38 Southampton St., W.C.2.

**Electromatic.** 716,302. Class 7. Electrically operated hammer mills. Scottish Mechanical Light Industries Ltd., Scotmec Works. 42/44, Waggon Road, Ayr, Scotland.

**Vida.** 715,551. Class 9. Devices for use in measuring stress, strain or tension by electrical means. Jones, Stroud and Co., Ltd., Vida Mills, Long Eaton, Nottingham.

**Zorst.** 716,680. Class 11. Exhaust fans used in ventilation equipment for exhausting fumes and dust. Battery Tools and Accessories Co., Ltd., 246/8 Cavendish Rd., S.W.12.

**PRICE OF CABLE METALS AND OTHER MATERIALS**
*(at Tuesday night)*

| | £ s. d. | New York price |
|---|---|---|
| COPPER, electrolytic ... ... ... | 252 0 0 | — |
| LEAD, good soft pig (foreign)... ... | 85-85¼ | 106 0 0 |
| TIN (99·99·76%) ... ...(Cash) | 692½-695 | — |
| ,, (3 months) ... ... ... ... | 690-692½ | — |
| ALUMINIUM, commercial purity (del.) | 161 0 0 | — |
| ZINC ... ... ... ... ... | 70½-71 | 88 0 0 |
| ARMOURING: | | |
| Galv. Steel Wire (0·104 in.) ... | 50 10 0 | — |
| Mild Steel Tape (0·04 in.) ... | 40 0 0 | — |

# GAZETTE ANNOUNCEMENTS

## COMPANIES ACTS

*Voluntary Liquidation*

**Alexander Jager Trading Co., Ltd.** Resolution passed for voluntary winding-up at meeting on May 22. At statutory meeting of creditors statement of affairs presented showing liabilities amounting to £6,740, of which £212 was due to preferential creditors; £4,384 to trade creditors; £55 in respect of expenses, and £1,819 to loan creditor. Assets were estimated to realise £2,713, leaving a deficiency of £3,757. After full discussion creditors passed resolution confirming voluntary liquidation with Mr. B. Phillips, acc., 76 New Cavendish St., W.1, as liquidator, with a committee of inspection. Creditors are requested to send particulars to liquidator by June 26.

**Adelaide Electric Supply Co. Ltd.** Resolution for voluntary winding-up passed at meeting on May 25 when W. E. Carnelley of 14 George St., Mansion House, London E.C.4, was appointed liquidator. Creditors are asked to send particulars to him by June 30.

**The Pier Electrical (Brighton) Ltd.** Meeting of creditors will be held at A. E. Orbell and Co., cert. acc., 7 Old Steine, Brighton, on June 11 at 12 noon.

**George Franks and Co. (Guildford) Ltd.** Last day for receiving proofs in respect of intended dividends, June 13. Liquidator is J. M. Clarke, Sr. Official Receiver, Inveresk House, Strand, W.C.2.

**Berec Battery Export Co., Ltd.** Resolution for voluntary winding-up passed at meeting on May 28. C. E. M. Emmerson, C.A., 28 King St., E.C.2, was appointed liquidator.

**Electronic Services (Westerham) Ltd.** Resolution for winding-up passed at meeting on May 18 when F. Goodman, Cert. Acc., 3 Broad St. Buildings, Liverpool St., E.C.2, was appointed liquidator.

## BANKRUPTCY ACTS

*First Meetings*

**London.** John W. Cartwright, electrical engineer of 166 Lewisham Rd., S.E.13. First meeting at Bankruptcy Buildings, Carey St., W.C.2, on June 12 at 11.30 a.m., and public exam at same address on July 23 at 11 a.m.

**London.** A. King and Son, electrical engineers of 28 Berkeley Sq., W.1. First meeting at Bankruptcy Buildings, Carey St., W.C.2, on June 16 at 11.30 a.m., and public examination at same address on July 15 at 11 a.m. Date of receiving order, May 22.

*Release of Trustee*

**Edmonton.** John L. Rose, electrical engineer of 9 Wades Hill, Winchmore Hill, N.21. Trustee was W. J. W. Hill, 3 Central Buildings, Matthew Parker St., Westminster.

**Windsor.** Edward W. Thorne, electrical engineer trading at 123 King St., Maidenhead. Trustee was R. L. Davis, C.A., 58 Theobalds Rd., W.C.1.

*Appointment of Trustee*

**Worcester.** Harry Bullock, trading as H. Bullock and Sons, electrical engineer at 17 High St., Bromyard. Trustee is W. LeR. Hand, Fletchers Chambers, Fore St., Birmingham.

*Intended Dividend*

**Grimsby.** Kenneth G. Rudd, radio and electrical contractor, trading at 52 Eastgate, Louth, Lincs. Last day for receiving proofs, June 12. Trustee is L. F. McCulloch, 26 South St. Mary's Gate, Grimsby.

*Dividend*

**Aylesbury.** Leonard G. Sharp, electrician of 4 Summerley's Rd., Princes Risborough. Supplemental dividends of 2·98d. in £ payable at 55 North St., Thame, on June 22.

# BUSINESS PROSPECTS

## HOME

**Barnsley.** Tenders to be invited soon for Athersley secondary school, estimated to cost £181,632.

**Birmingham.** Factory proposed at Birmingham Factory Centre for R. Arnold and Co. Ltd.

**Blaby (Leics.) R.D.C.** Sixty-eight flats to be built in district.

**Bromsgrove U.D.C.** Construction of 20 houses on Charford estate. Engineer and Surveyor, Council Offices.

**Bury St. Edmunds T.C.** Approval sought to plans for the extension of Mildenhall Rd. housing estate.

**Chesterfield T.C.** Construction of 112 houses in two groups on Pevensey estate. Borough Engineer and Surveyor, Town Hall.

**Consett (Dur).** Light Fabrications Ltd. are to convert Villa Real, former land army hostel, into factory.

**Co. Down.** Application to be made to borrow £123,600 for erection of intermediate school at Ballynahinch.

**Crook and Willington U.D.C.** Erection of 100 houses on Old Wheatbottom site. W. G. Omand, Clerk of Council, Council Offices, Glenholme, Crook.

**Daventry.** T.C. has approved plans for factory proposed by Daventry Engineering Co. Ltd., Oxford St., Daventry.

**Dowlais (Glam).** Birmingham Small Arms Co. Ltd. propose erection of factory to plans by G. Coles, 40 Craven St., London W.C.2.

**Durham.** Application made to borrow £5,284 for supplying electricity to 320 houses on Sherburn Rd. estate and at Hatfield View.

**Easington R.D.C.** Twenty houses to be built at S. Hetton, 36 at Murton and 34 at Wheatley Hill.

**East Riding.** It is proposed to erect new £176,000 secondary school early next year.

**Elland (York) U.D.C.** Plans submitted for Ministry approval for construction of 78 houses on Thomas St. estate.

**Enfield U.D.C.** Erection of 36 houses and 16 flats on Bycullah estate. Engineer and Surveyor, Frank Lee, 7 Little Park Gdns.

**Frome U.D.C.** Plans in hand for erection of 97 dwellings on Rodden Rd. estate.

**Gateshead T.C.** Plans in hand for building of 196 dwellings on Barn Close site.

**Golborne U.D.C.** Erection of 32 houses and 10 bungalows at Culcheth. J. B. Hoyle, Engineer and Surveyor, Council Offices, Lowton, nr. Warrington.

**Harold Hill (Essex).** Architects for factory proposed by M. Cooper Ltd. are M. Evans and Son, 21 Brunswick Sq., W.C.1.

**Hartlepool.** Tenders to be obtained for erection of shops in Northgate area. Further shops to be built there later. Also T.C. is considering alterations to Borough Hall.

**Hertfordshire.** Among schools to be erected are grammar school at Bennetts End, Hemel Hempstead, costing £198,334; and infants' school at Chaulden, costing £99,164.

**Hornchurch.** Planning approval given to erection of factory at Rainham by Horn Construction Co., Finsbury Pavement House, Moorgate, E.C.2.

**Houghton-le-Spring U.D.C.** Loan sanction received for erection of 44 houses on Fence Houses estate.

**Ilford.** John Bodger Store, Ltd., 113 High Rd., propose to build 3-storey store in Station Rd. Architects are Higgins and Thomserson, 76 Finsbury Pavement, London, E.C.2.

**Kirkburton (York) U.D.C.** It is planned to erect 30 houses at Lepton, 8 at Shepley and 20 at Flockton.

**Lambeth B.C.** Site being sought in Larkhall Lane and Studley Rd. for erection of primary and nursery schools.

**Lambeth.** L.C.C. approval sought for erection of 4-storey block of flats with shops on York Hill estate extension.

**Leatherhead U.D.C.** It is proposed to build 153 houses near Bramley Way estate.

**Leek (Staffs) R.D.C.** Scheme approved for erection of 55 houses and 24 flats at Norton Green.

**Leyland (Lancs).** Greenall Whitley and Co., Ltd., of St. Helens, have been granted a licence for new residential hotel in Cow Lane. Estimated cost £100,000.

**Llandrindod Wells.** Approval received for erection of £14,000 fire station in the district.

**Luton T.C.** Construction of 150 houses on Runfold estate. Borough Engineer, Town Hall.

**Malvern U.D.C.** Construction of 89 houses on Pound Bank site. C. C. Judson, Surveyor and Water Engineer, The Council House.

**Manchester.** Cruickshank and Seward, 334 Wellington Rd. North, Stockport, are architects for factory proposed by the Sharston Engineering Co., Ltd.

**Middlesbrough T.C.** It is proposed to erect further 84 houses at Park End. Borough Engineer is J. A. Kenyon.

**Newcastle-on-Tyne T.C.** Erection of 221 houses on Kenton North estate. City Architect, 18 Cloth Market. Also plans approved for proposed Stocksfield Ave. primary school estimated to cost £142,054.

**Newport (Mon) T.C.** Plans in hand for three-storey flats at Malpas Court (North), total of 587 houses at St. Julian's Neighbourhood, 94 houses and 60 flats on Brynglas estate, and 8 flats on Blaen-y-Pant estate.

**Northamptonshire.** Sketch plans approved for first instalment of £102,000 College of Further Education at Corby. Similar approval given for instalment of Duston modern school, £127,525, and second instalment of £99,225 John Lee school at Wellingborough.

**Northern Ireland.** Erection of 102 dwellings at Omagh, Tyrone, N.I. Housing Trust, 12 Hope St., Belfast. Ministry of Commerce expects to place contracts during the current year for building factories 73,000, 86,000, 20,000 and 26,000 sq. ft. and three others of 18,000 sq. ft. each.

**North Kesteven R.D.C.** Revised plans approved for 64 flats at Bracebridge Heath.

**Northumberland.** During current year £2,505 is to be spent on installing electric lighting in nine schools.

**Ossett T.C.** Erection of 44 houses on six sites. Borough Surveyor's Office, Town Hall.

**Rothbury R.D.C.** Work to begin shortly on erection of another 60 houses. Surveyor is J. M. Oliver, Council offices.

**Saddleworth U.D.C.** Erection of 104 houses and 12 flats on Carr Barn estate. Howard and Benson, chart. archs., 88 Mosley St., Manchester.

*(Contd. on page 1128)*

*Business Prospects contd.)*

**Southwell R.D.C.** Construction of 24 bungalows, 18 houses and 8 flats in Forest Rd., Ollerton. Council's Surveyor, S. Cooper, 8 Westgate Rd.

**Spalding U.D.C.** Ministerial approval sought for construction of £25,353 town hall in Churchgate.

**Stamford (Lincs) T.C.** Work expected to start in September on further 48 houses. Plans by F. J. Lenton and Partners, Broad St., Stamford.

**Swansea.** Tenders to be invited in autumn for new showroom and offices for Wales Gas Board. Manager, Swansea Undertaking, Wales Gas Board, Oystermouth Rd.

**Thornbury (Glos) R.D.C.** to build 62 houses in Rodway, Cavendish and Stroud Roads.

**Truro T.C.** Erection of 23 houses at Malabar. City Engineer and Surveyor, Municipal Buildings.

**Wakefield T.C.** City Engineer has prepared plans for erection of 3-storey flats in Sun Lane.

**Wembley.** G. Humphries and Co. Ltd., of 71 Whitfield St., W.1, propose the erection of factory in Manor Farm Road.

**West Ashford (Kent) R.D.C.** Land to be bought near Queen's Head for erection of about 40 houses.

**West Bridgford U.D.C.** Erection of 20 old persons' dwellings on Edwalton estate. R. Dewsberry, Engineer and Surveyor, The Hall.

**Witham (Essex) U.D.C.** 158 houses to be built on Maldon Rd. estate, and further 82 dwellings and a shop on Rivenhall Oak site.

**Woodbridge (Suff) U.D.C.** Construction of 30 houses in district. Surveyor's Office, 17 Thoroughfare.

### OVERSEAS

**Mauritius.** Central Electricity Board is asking that electrical and other allied manufacturers place them on mailing lists for catalogues and other information concerning their products. Current issues should be sent to A. N. Bott, General Manager of Board, Port Louis, Mauritius.

**U.S.A.** Bruce-Emmett Co. of 830 S.E. Alder, Portland 14, Oregon, want to receive offers on goods, mainly electrical. Goods include iron conduit fittings, porcelain insulators and sockets, floodlights, reflectors, switches, fuses, etc.

## TRADE NOTES

**Annual holidays.** British Insulated Callender's Cables, Ltd. state that their Prescot, Helsby, Melling and Huyton Quarry works and Willenhall Foundry will be closed from July 25 to August 8; Erith works from July 18 to August 3, and Anchor works, Leigh, from July 4 to 11 and September 12 to 19, inclusive.

The Head Offices and works of Higgs Motors, Ltd. will be closed from Friday evening, July 24 until Monday morning August 10.

**Change of Address.** The Scottish area sales and service engineer of Wild-Barfield Electric Furnaces, Ltd. (Mr. D. McDermott) has moved to 147 Bath Street, Glasgow, C.2. His telephone number remains Douglas 8839.

**Agency.** Following a recent visit to France by Mr. I. Schad, managing director of James Scott and Co. (Electrical Engineers), Ltd., 175 St. Vincent Street, Glasgow, that firm has been appointed sole British agents for "Tourtellier" mechanical handling equipment, including the "Monorail" travelling electric pulley block.

## MEETINGS TO NOTE

### THURSDAY, JUNE 11

INCORP. PLANT ENGRS. (Newcastle-on-Tyne).—"Plant Engineer and the Factories Act," A. Hewitt. Roadway House, Oxford St., 7.30 p.m.

I.E.S. (London). — "American Lighting Practice." Dr. Ward Harrison of G.E.C. of America. 2 Savoy Hill, W.C.2, 6 p.m.

### FRIDAY, JUNE 12

S. WALES INST. OF ENGRS.—Engineers' Coronation dinner and dance at Assembly Room, City Hall, Cardiff, 7 p.m.

### MONDAY, JUNE 15

I.E.E. (Western Centre).—Annual meeting. "Cosmic Ray Detection." Dr. W. G. K. Menon. Elect. House, Colston Ave., Bristol, 5.15 p.m.

INCORP. PLANT ENGRS. (Merseyside).—"Industrial Smoke Abatement," P. H. Saunders. Radiant House, Bold St., Liverpool, 7.15 p.m.

### EXHIBITION DIARY

**British Plastics.** Opened at Olympia on June 3, continuing until June 13.

**Business Efficiency.** 40th show opens at Olympia on June 16 and closes on June 26.

**Safety and Factory Efficiency.** Will open at Bingley Hall, Birmingham, on June 19 and continue until the 26th.

## NEW COMPANIES

*Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.*

**Brayhead Components Ltd.,** Full View Works, Kennel Ride, Ascot, Berks. Dealers in and manufacturers of springs and pressings, lamps, electric bulbs, etc. Cap.: £6,000. Dirs.: W. Murphy and F. J. J. Pusey.

**Roland Harris and Co. Ltd.,** 1a Portland Grove, Heaton Moor, Stockport, Ches. Electrical engineers and contractors, manufacturers of and dealers in wireless apparatus, cabinets, loud speakers, etc. Cap.: £100. Dirs.: R. Harris and Norah Harris.

**Super Vision Ltd.** Manufacturers of and dealers in electrical goods, wireless and television sets, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs.: R. Phillips, 28 Sarre Rd., N.W.2, and C. S. Newman, 25 Cotswold Gdns., N.W.2.

**Shardlow Micrometers Ltd.,** 23 Blomfield St., E.C.2. To acquire that part of undertaking of Ambrose Shardlow and Co. Ltd., which is concerned with manufacture and sale of micrometers; manufacturers of and dealers in all kinds of scientific, industrial and precision instruments, etc. Cap.: £5,000. Dirs.: To be appointed by subs. Subs.: Barbara E. Grove-White and Marian Beadle, 6 Austin Friars, E.C.2.

**Slater Insulations Ltd.,** 36 New Broad St., E.C.2. Insulating, heating and refrigerating engineers, etc. Cap.: £2,000. Dirs.: C. S. Slater and H. G. Kilbey.

**Sound and Vision Services Ltd.** Manufacturers of and dealers in wireless, radio, television and electrical equipment, etc. Cap.: £1,000. Dirs.: to be appointed by subs. Subs.: T. D. Nash, 94 Malden Rd., New Malden, Surrey, and M. Metcalf, 17 Manor Gdns., Merton Park, S.W.20.

**Frank Stevens (Electrical) Ltd.,** 17 Fore St., Cullompton, Devon. To take over business of a radio, television and electrical engineer, carried on as "Frank H. Stevens" at Cullompton, Devon. Cap.: £3,000. Dirs.: F. H. Stevens and Mrs. R. I. Stevens.

# VARIABLE SPEED MACHINE DRIVES

with *Hewittic* VELOTROL *Rectifiers*

HEWITTIC Velotrol rectifiers provide the ideal means of achieving exceptionally wide range, positive fine speed control of motor driven machinery.

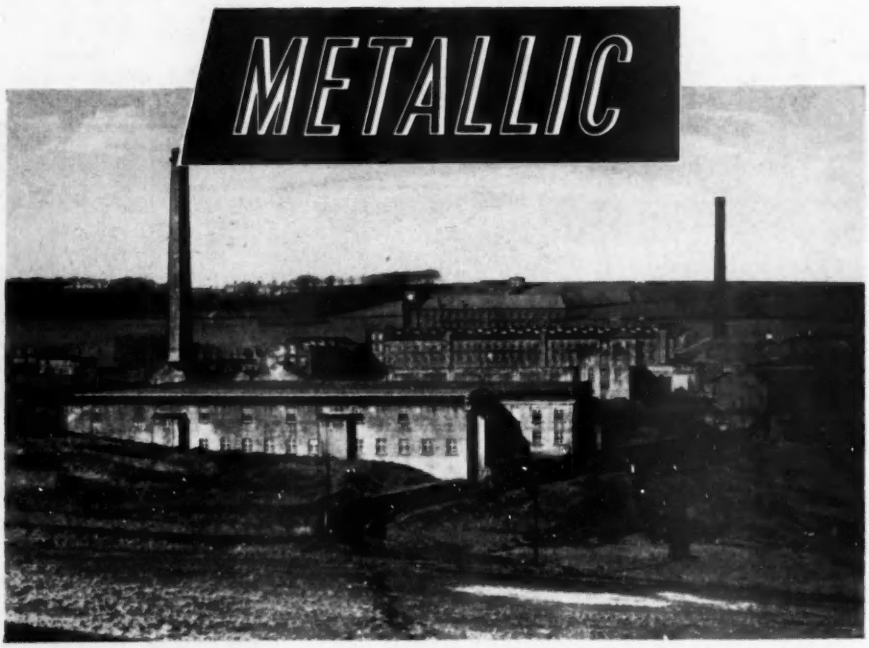
Hackbridge and Hewittic Electric Company Ltd. can offer, from wide experience, static conversion equipment using modern electronic or electro-magnetic control systems providing manual or automatic operation.

Send us details of your problems.

*Illustrated above: Hewittic Velotrol rectifier operating a 54" diameter Horizontal Bull Block for drawing tubes, driven by a 75 h.p. variable speed D.C. motor. (Courtesy: Marshall Richards Machine Co. Ltd.) also a typical Velotrol rectifier installation powering variable speed machinery.*

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric, Walton-on-Thames"

***CONDUIT & FITTINGS SUPPLIED BY***




*Denholme Mills, nr. Keighley* *Photograph by courtesy of W. H. Foster Ltd.*

A TI COMPANY

It may be a school, it may be a factory—a power station or a housing estate, but more often than not the electrical specification will be—METALLIC.

This Yorkshire mill is no exception, being fitted throughout with METALLIC conduit and fittings—unequalled for quality and consistent accuracy.

***THE METALLIC SEAMLESS TUBE CO. LTD.***

**LUDGATE HILL • BIRMINGHAM • 3**

ALSO AT LONDON • NEWCASTLE-ON-TYNE • LEEDS • SWANSEA & GLASGOW

# CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

**Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.**

## TENDERS INVITED

### LITHERLAND URBAN DISTRICT COUNCIL

BRIDGE ROAD—SODIUM STREET LIGHTING

TENDERS are invited for the supply and installation of LANTERNS, LAMPS, CONTROL GEAR and CONCRETE COLUMNS, for Class "A" lighting.

Contract documents and drawings may be obtained from the Engineer and Surveyor, Town Hall, Liverpool 21, on payment of a deposit of £1 1s. which will be returned on receipt of a bona fide tender.

Tenders to be delivered to the Clerk of the Council, Town Hall, Liverpool 21, not later than Monday, June 29, 1953. (E 79)

### BOROUGH OF BROMLEY

GROUP "A" STREET LIGHTING IMPROVEMENT SCHEME

Section No. 3

TENDERS are invited for the improvement of the street lighting in College Road, West Street, North Street and part of Tweedy Road, for a length of approximately ¾ mile. The work includes dismantling existing tungsten lighting, moving and re-erecting existing 25-ft. steel tubular columns, supply and erection of new tubular steel columns, and fixing approximately 38 enclosed 140 W sodium lanterns with associated equipment and wiring.

Contractors wishing to tender should apply for bills of quantities, form of tender and drawing, not later than Monday, June 29, 1953, to the Borough Engineer, Municipal Offices, Bromley, Kent, enclosing a deposit of £2 2s., which will be refunded on receipt of a bona fide tender not subsequently withdrawn.

Tenders, in a plain sealed envelope, marked "Tender—Street Lighting" must be delivered to the undersigned not later than Monday, July 13, 1953.

The Council does not bind itself to accept the lowest or any tender.

S. CRITCHLEY AUTY,
Town Clerk.

Municipal Offices,
Bromley, Kent.
June 9, 1953. (E 121)

### BENTLEY-WITH-ARKSEY URBAN DISTRICT COUNCIL

SODIUM DISCHARGE LIGHTING
GREAT NORTH ROAD

TENDERS are invited for the lighting of about 2 miles of trunk road, as follows:—

(a) Supply of lanterns, lamps and control gear.

(b) Supply and erection of columns, fitting and wiring of equipment.

(c) Provision of underground cable.

Tenders may be submitted for any or all of the above work, each of which will form a separate contract.

Drawings, Specification, Bills of Quantities and Form of Tender may be obtained from, and the Conditions of Contract inspected at, the office of the Engineer and Surveyor at the address below, on deposit of two guineas, returnable only on receipt of a bona fide tender and the return of all documents.

Sealed tenders in envelopes not bearing any mark indicating the name of the sender, and endorsed "Great North Road Lighting," must reach the undersigned not later than Monday, July 6, 1953.

The Council does not bind itself to accept the lowest or any tender.

W. H. CARLILE,
Clerk to the Council.

Council Offices, Cooke Street,
Bentley, Nr. Doncaster.
June 5, 1953. (E 112)

### COUNTY BOROUGH OF MERTHYR TYDFIL

ELECTRICAL INSTALLATIONS AND REWIRING OF SCHOOLS AND PUBLIC BUILDINGS

TENDERS are invited for the provision of electrical installations and rewiring; wiring to be with vulcanised india rubber cables, drawn into steel conduits, together with all necessary fittings, switches, etc., in the following buildings:—

1. Queen's Road Modern School.
2. Intermediate Grammar School.
3. Heolgerrig Junior Mixed and Infants School.
4. Troedyrhiw Infants School.
5. Georgetown Modern School.
6. Georgetown Infants School.
7. Dowlais Branch Library.
8. Cyfarthfa Castle School.

Contractors have the option of tendering for any or all of the above installations, but it will be conditional that work in all the buildings tendered for must be carried out simultaneously during the school summer holiday period.

Form of tender, specification and drawings will be forwarded upon application. A deposit of three guineas, returnable to bona fide tenderers, or upon the return of the documents seven days before the closing date of the advertisement, must accompany the application.

Conditions of contract may be inspected during the usual office hours at the Borough Engineer's Department, Town Hall, Merthyr Tydfil.

Tenders in envelopes, endorsed "Electrical Installations," must be delivered to the undersigned not later than June 18, 1953.

The Council does not bind itself to accept the lowest or any of the tenders.

T. S. EVANS,
Town Clerk.

Town Hall,
Merthyr Tydfil.
June 1, 1953. (E 92)

## APPOINTMENTS VACANT

*Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.*

### SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ASSISTANT
Purley District

SALARY £520 by £20 to £580 per annum plus London Weighting under N.J.C. Grade 3. Applicants must have practical experience in all aspects of wiring contracting, including preparation of estimates and a good background knowledge of consumer service, tariffs and sale of fittings.

Applications, giving two referees, must reach J. McAlister, B.Sc., A.M.I.E.E., District Manager, SEEBoard, Electric House, High Street, Purley, Surrey, by June 22, 1953.

FIRST ASSISTANT DISTRICT ENGINEER
Brighton and Hove District

Salary £831 to £867 per annum under N.J.B. Class "G," Grade 5. Applicants should be qualified engineers with sound knowledge of all aspects of the work of a District Distribution Department. Experience should include the planning, construction, operation and maintenance of a.c. systems up to 33 kV and preferably also the operation and maintenance of d.c. networks and conversion plant. Knowledge of changeover procedure an advantage.

Applications, giving two referees, must reach A. M. Harker, M.A.(Cantab), Brighton and Hove District Manager, SEEBoard, Electric House, Castle Square, Brighton, by June 22, 1953.

A. L. BURNELL,
Secretary. (E 113)

## BRITISH ELECTRICITY AUTHORITY

*London Division*

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Agreement. Schedule "A" and "C". Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E., unless otherwise stated, an advantage.

BOILER HOUSE SUPERINTENDENT
Deptford West Generating Station.

Qualifications: Corporate Membership of I.E.E. or I.Mech.E. Wide experience necessary in the efficient operation and maintenance of large modern generating plant and aux. equipment, together with ability to plan and organise work to a strict time schedule. Experience in control of labour with modern concept of management essential. Salary: Class "J," Grade 6, £927 3s. p.a.

2nd ASSISTANT STATION CHEMIST
Deptford Generating Stations

Experience in the chemistry of the power industry and should preferably have held a responsible post in a laboratory. These stations operate at 225, 375 and 900 p.s.i. Salary: Class "L," Grade 11, £752 17s. p.a.

SHIFT CHARGE ENGINEER
Bow Generating Station

Considerable experience in efficient operation of turbo alternators and B. & W. boiler plants essential. Character and ability to deal with staff problems important. Salary: Class "F," Grade 7, £731 17s. p.a.

STATION SHIFT CONTROL ENGINEER
Bankside Generating Station

Experience in control and operation of modern generating plant and main switchgear. Salary: Class "H," Grade 10, £873 1s. p.a.

COAL AND ASH PLANT ENGINEER
Brunswick Wharf Generating Station

Experience of coal and ash-handling plant maintenance and operation. Control of unloading ships, arranging for coal and oil deliveries and for the removal of ash and dust, will be part of the responsibilities. Provisional grading Class "H," Grade 10, £873 1s. p.a.

ASSISTANT ENGINEER (OPERATION)
Deptford East Generating Station

Successful candidate will be responsible for turbine house operations and should be fully experienced in running-up, shutting-down and loading of h.p. turbo-alternators and ancillary equipment. Shift duties. Salary: Class "H," Grade 13, £549 3s. p.a.

JUNIOR ENGINEER
St. Pancras Generating Station

Generating station experience an advantage, good opportunity for gaining further experience. Salary: Class "E," Grade 14, £470 p.a.

GENERAL ASSISTANT ENGINEER
Transmission Department, Divisional Headquarters

Experience in the operation and maintenance of a high voltage transmission system or a works training on high voltage switchgear and transformers. Salary: Class "AX/EX," Grade 8, £526 1s. to £749 14s. p.a.

Application may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, W.1, and be received within 14 days of this advertisement. (E 105)

## NORTH EASTERN ELECTRICITY BOARD

*Wear Sub-Area*

APPLICATIONS are invited for the appointment of GENERAL ASSISTANT ENGINEER in Commercial Officer's Department, Sub-Area Headquarters, Sunderland.

Applicants should be qualified engineers and experience of Commercial Officer's Department will be advantageous. Salary, Schedule "A," Class L, Grade 13—£816/646, N.J.B. Conditions of Service.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), The North Eastern Electricity Board, Carliol House Newcastle-upon-Tyne 1, within ten days of the appearance of this advertisement. (E 97)

## BRITISH ELECTRICITY AUTHORITY

*South Eastern Division*

LITTLEBROOK POWER STATION—ASSISTANT ENGINEER (EFFICIENCY). The successful applicant will be responsible to the Operation and Efficiency Engineer for the efficiency and testing of a section of the plant. Preference will be given to those possessing Higher National Certificate or equivalent and who have had previous experience in the operation and/or testing of high pressure plant. N.J.B. conditions of service and salary Class "M," Grade II, £793 16s. p.a. including London Allowance. Applications, giving details of education, present position, experience, etc., should be received by the Station Superintendent, Littlebrook Power Station, near Dartford, Kent, by June 22. (E 111)

## MIDLANDS ELECTRICITY BOARD

SENIOR ASSISTANT ENGINEER required in the Birmingham and District Sub-Area. Extensive experience necessary in design, construction, operation and maintenance of large transmission and distribution systems. A knowledge of building construction would be an advantage. Applicants should be Corporate Members of the Institution of Electrical Engineers. Salary £1,300/£1,341 per annum (N.J.B. Grade N.4) superannuable.

Apply within 14 days, stating age, experience, salary and position, to: Sub-Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
(E 98)

## SOUTH WEST SCOTLAND ELECTRICITY BOARD

THE SOUTH WEST SCOTLAND ELECTRICITY BOARD invite applications for appointments as DISTRICT COMMERCIAL ENGINEER in the Lanarkshire Sub-Area of the Board. The posts are on Grade 3 of the National Joint Board Agreement and the classifications and salaries are as follows:

Coatbridge District, Class "F," £912/£951.
Hamilton District, Class "D," £813/£843.
Lanark District, Class "E," £858/£894.
Motherwell District, Class "F," £912/£951.
Newlands District, Class "E," £858/£894.
Rutherglen District, Class "E," £858/£894.
Uddingston District, Class "F," £912/£951.

Applicants should be corporate members of the Institution of Electrical Engineers or possess an equivalent qualification in electrical engineering, and preferably have experience in the utilisation of electrical energy in industry, commercial, domestic and agricultural premises, a knowledge of installation work and be conversant with tariffs, sales and all aspects of service to consumers.

The appointments are superannuable and may be subject to medical examination.

Forms of application, which may be obtained from the applicant's Sub-Area Manager or the undersigned, should be completed and returned to the undersigned not later than Saturday, June 27, 1953.

Persons who recently submitted a form of application for similar appointments need only indicate that they wish to be considered for these vacancies.

J. MEEK,
Secretary.

62 Dalziel Drive,
Glasgow, S.1.
June 1, 1953. (E 93)

## CITY OF SALISBURY

### Southern Rhodesia

APPLICATIONS are invited for the following fixed establishment posts in the Electricity Department of the above Municipality:—

(a) GENERATION ENGINEER (salary scale £1,400 x 50—£1,700 p.a.) Applicants must have had extensive experience in the operation and control of large steam generating plants, preferably including experience with pulverised fuel fired boilers, and must be fully qualified mechanical and electrical engineers.

(b) POWER STATION SHIFTSMAN (salary scale £1,000 x 40—£1,200 p.a.). Applicants must have completed a technical education to the standard of Graduate of the Institution of Electrical Engineers or the Institution of Mechanical Engineers, and must have had experience in the operation of steam power station plant, including control room duties (preferably on an inter-connected system), and the running-up of steam turbine plant.

The above appointments are subject to Council's Service and Leave Regulations, which will be made available for inspection by selected candidates at the offices of the undersigned. The salaries payable will commence at the minimum of the above grades, rising by annual increments to the maximum salary of the grade (no cost of living or other allowances are payable).

The successful candidates must be able to comply with the regulations of the Southern Rhodesia Immigration Authorities, and will be required to submit a satisfactory medical certificate.

Applicants, who should be not more than 45 years of age, are requested to submit full particulars of their qualifications, training and experience, giving details of positions held and salaries received, marital state, age, place of birth and nationality. Copies of not more than three recent testimonials may be included.

Canvassing, directly or indirectly, will be a disqualification.

Applications, suitably endorsed on the cover, must reach the office of the undersigned on or before Saturday, June 27, 1953. Airmail paper should be used.

DAVIS & SOPER, LTD.,
Agents to the City Council of Salisbury.

52 and 54, St. Mary Axe,
London E.C.3.
May 18, 1953. (E 43)

## JERSEY ELECTRICITY CO. LTD.

QUALIFIED DEMONSTRATOR/HOUSECRAFT ADVISER required. Applicants should have experience of all types of domestic appliances and be able to give demonstrations and make contacts with womens' institutes and other bodies. Selling ability is essential. Commencing salary will be between £450 to £480 per annum and there will be plenty of scope and opportunities.—Applications should be addressed to the General Manager, The Jersey Electricity Co. Ltd., 11 Broad Street, St. Helier, Jersey, Channel Islands, and endorsed "Demonstrator." (D 83)

## BRITISH ELECTRICITY AUTHORITY

*Yorkshire Division*

APPLICATIONS are invited for the following appointments.—

POWER STATION SUPERINTENDENT
Blackburn Meadows Power Station, Sheffield

Salary £1,235 to £1,289 per annum, Class "H," Grade 1, N.J.B. Agreement.

Applicants should have had wide experience in the operation and maintenance of large modern power station plant, and have held a position of responsibility involving the control of staff.

MAINTENANCE ENGINEER (MECHANICAL)
Doncaster (New) Power Station

The ultimate capacity of this station will be 120 MW.

Salary £738 to £771 per annum, Class "F," Grade 6, N.J.B. Agreement.

Applicants should have had wide experience in power station mechanical maintenance and should preferably be Corporate Members of the Institution of Mechanical Engineers or hold equivalent qualifications.

MAINTENANCE ENGINEER (ELECTRICAL)
Halifax Power Station

Salary £738 to £771 per annum, Class "F," Grade 6 N.J.B. Agreement.

Applicants should have had a wide experience of power station electrical equipment and should preferably be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications.

Applications on Form AE.6, obtainable from the Divisional Secretary (Establishments), British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds, 7, to be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(E 118)

## BRITISH ELECTRICITY AUTHORITY

*East Midlands Division*

APPLICATIONS are invited for the following positions within the Division:—

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department. Vacancy No. 22/53.

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with office and administrative buildings.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

JUNIOR ENGINEER
Hinckley Power Station. Vacancy No. 58/53.

Candidates should have gained an Ordinary Certificate in Electrical Engineering and have had experience in a power station.

The salary will be in accordance with Schedule "A," Class "B," Grade 13 (£390 per annum) progressing to Class "B," Grade 12 (£404 to £423 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be June 22, 1953.

ENGINEERING DRAUGHTSMEN (ELECTRICAL)
Construction Department. Vacancy No. 61/53.

Candidates should have experience in the preparation of layouts and diagrams for the installation of e.h.t. and l.t. switchgear, transformers, e.h.t. and l.t. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

The above appointments will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(E 114)

## SAO PAULO LIGHT AND POWER COMPANY LIMITED

(A British Company in Brazil)

APPLICATIONS are invited from suitably qualified men for positions in the Piratininga Power Station now under construction near Sao Paulo (pop. 2·5 millions; temperate climate; 2,200 ft above sea level). Good salary, three years' agreement subject to renewal with first class passage both ways; four months' paid leave after three years' service; superannuation scheme. Limited number of the company's houses are at site and others available nearby for rent. The plant will comprise initially 2 x 80 MW, 1,800 r.p.m. steam turbo-alternator units, each supplied at 850 p.s.i., 900 deg. F by one 850,000 lb/hr oil-fired boiler. The positions to be filled and the qualifications desired are:—

DEPUTY CHIEF OF PLANT: wide practical experience in the operation, maintenance and administration of a modern high-pressure power station; experience of oil-firing will be an advantage; ability to maintain harmonious labour relations is essential.

EFFICIENCY ENGINEER: sound basic knowledge of physics, mechanics, thermo-dynamics and mathematics, and wide practical experience of operating and conducting performance tests on modern steam power station plant; must have the ability to express himself clearly and an aptitude for training unskilled labour for operational duties. Preference will be given to applicants who have had practical experience in studying the behaviour of large steam turbines and boilers when operated under "two-shift" conditions.

MAINTENANCE ENGINEER: considerable experience of modern power station maintenance, water-tube boilers, heat exchangers, large turbo-alternators, high-voltage switchgear, and all mechanical and electrical auxiliary equipment.

SHIFT CHARGE ENGINEER: sound technical knowledge and wide experience of the operation of modern turbines and boilers, preferably with oil or pulverised-fuel firing; should also have an aptitude for supervision and the maintenance of harmonious labour relations.

STATION CHEMIST: appropriate academic chemical qualifications, a thorough knowledge and practical experience of fuel, water and oil analysis, long experience of boiler water treatment and the prevention of corrosion, and extensive experience in dealing with the chemical engineering problems of a modern thermal station.

Certain of the above positions were advertised last year, but are being re-advertised in view of the dates when the successful candidates will now be required in Brazil.

Successful candidates for the first three posts will be required in Brazil about October and the remainder not later than the end of the first quarter of 1954. Written application should be made to Mr. W. P. Kellett, Joint Manager, Canadian-Brazilian Services Ltd., 148 Leadenhall Street, London E.C.3, not later than June 22, 1953. (E 103)

## BRITISH ELECTRICITY AUTHORITY

*South Western Division*

TECHNICAL STAFF VACANCIES

(a) ASSISTANT ENGINEER (ELECTRICAL). Hayle Generating Station. N.J.B. Class "F," Grade 10, £577 to £598.

(b) STATION SHIFT CONTROL ENGINEER. Plymouth "A" Generating Station. N.J.B. Class "F," Grade 10, £577 to £598.

For (a) candidates should have previous experience in electrical maintenance at power stations on h.v. and l.v. switchgear, motors, remote control and relay protective equipment. Technical qualification should be up to H.N.C. (Elec.) standard, but candidates with O.N.C. (Elec.) will be considered if they have had sufficient practical experience.

For (b) candidates should possess good technical qualifications, and have had training and experience in the control and operation of steam generating plant and main switchgear.

Applications on Form A.E.6/ACT obtainable from the Divisional Secretary, 26 Oakfield Road, Bristol 8, should be completed and returned by June 22, 1953. (E 104)

## SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT COMMERCIAL ENGINEER (INSTALLATION)

Tunbridge Wells District

SALARY £555 to £569 under N.J.B. E.10. Applicants should be qualified to assist in installation and contracting work and in the preparation of estimates and tenders.

Applications, giving two referees, must reach T. W. Dann, M.Eng., M.I.E.E., Tunbridge Wells Manager, Town Hall, Tunbridge Wells, by June 20, 1953.

A. L. BURNELL,
Secretary.
May 30, 1953. (E 81)

## GOVERNMENT OF KUWAIT

DIESEL POWER STATION SHIFT ENGINEERS required for service with the Government of Kuwait, Persian Gulf. Applicants, preferably not more than 35 years of age, should have some technical qualifications, together with good experience in the operation and maintenance of diesel engines and generators, and also sufficient electrical knowledge of an a.c. distribution system to be able to operate the power plant in the station efficiently. Steam power plant operation experience would be advantageous, as at a later date a steam power station will be operating and it might be possible to transfer the services of the diesel power station shift engineers over to the steam station. The starting consolidated salary offered is at the rate of £1,500 to £1,600 per annum, according to experience. Free furnished quarters and free medical attention are provided; or an allowance in lieu thereof. The first year will be probationary, and if satisfactory, home leave will be granted at the end of three years complete service. Married accommodation cannot be promised within one year.

Applications, stating age and giving full details of qualifications and experience, should, in the first instance, be addressed to the Secretary, Ewbank and Partners, Ltd., 10-11 Grosvenor Place, London S.W.1. (E 106)

## ELECTRICITY SUPPLY BOARD (IRELAND)

VACANCY FOR CHEMIST

APPLICATIONS are invited for a position as a Chemist in the Board's Generating Station (Marina), Cork. Applicants must hold an honours degree in Science, or an equivalent qualification, with chemistry as a major subject and should have at least five years suitable post-graduate experience.

The salary scale at present attaching to the position is £782 to £1,061 inclusive. The appointment will be on a probationary basis for a period of 12 months.

Applications, indicating age, qualifications and full particulars of training and experience should be addressed to the Board's Personnel Officer, 27, Lower Fitzwilliam Street, Dublin, and reach him not later than Saturday, June 18, 1953.

PATRICK J. DEMPSEY,
Secretary.
(E 99)

## NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of GENERAL ASSISTANT ENGINEERS in the Chief Engineer's Department, Carliol House, Newcastle-upon-Tyne, in (a) Construction Section, (b) Operation and Maintenance Section, (c) Planning and Development Section.

Applicants should have had a sound technical training and possess Higher National Certificate in Electrical Engineering or other approved qualifications. Salary, Schedule "C," Grade 8, £501/£694, N.J.B. conditions of service.

Applications, stating age, qualifications and experience, should be forwarded to the Secretary (Establishments), the North Eastern Electricity Board, Carliol House, Newcastle-upon-Tyne, 1, within ten days of the appearance of this advertisement. (E 94)

## EASTERN ELECTRICITY BOARD

*Essex Sub-Area* 34/53.R

METER REPAIRERS (MECHANICIANS)—SOUTHEND

THE rates of pay and conditions of service will be in accordance with the National Joint Industrial Council Agreement for the Electricity Supply Industry, present rate of pay being 3s. 6½d. per hour for a five-day week of 44 hours.

Applications in writing, stating age, experience and present employment should be submitted to the Engineer, Eastern Electricity Board, Essex Sub-Area, "Millfield," near Brentwood, Essex, within 14 days of the appearance of this advertisement. (E 116)

## CROWN AGENTS FOR THE COLONIES

ELECTRICAL MAINTENANCE ENGINEER required by the Civil Aviation Department, Nigeria, for one tour of 18 to 24 months in the first instance. Salary, etc., either (a) in scale £1,085 rising to £1,315 a year, with prospect of permanency, or (b) in scale £1,170 rising to £1,453 on a temporary basis, with gratuity at the rate of £100 a year. Outfit allowance, £80. Free passages for officer and wife, and assistance towards cost of children's passages or their maintenance in U.K. Liberal leave on full salary. Candidates must have considerable experience of the maintenance of large electrical installations and will be required to take charge of the maintenance of all electrical plant and equipment at the international airport, Kano, including high-intensity approach and runway lighting, standby diesel generating plant, low-voltage switchgear and air-conditioning plant.

Apply in writing to the Crown Agents, 4 Millbank, London, S.W.1, stating age, name in block letters, full qualifications and experience, and quoting M2C/20942/EE. (E 124)

## BRITISH ELECTRICITY AUTHORITY

*South Eastern Division*

SECOND ASSISTANT ENGINEER (System Development) in the Divisional Technical Engineer's Department at Kingston.

APPLICANTS should preferably be corporate members of the Institution of Electrical Engineers and possess an honours degree. A thorough knowledge of power system technology coupled with the ability to apply this knowledge to practical problems involving system and generator stability, the calculation of symmetrical and non-symmetrical short circuits, load flows, voltage regulation, etc., is essential. The work is concerned with the consideration of schemes of reinforcement to the high voltage transmission system, and the connection of new generating stations, together with any other technological work which may be necessary. N.J.B. conditions of service and salary, Class "AX/DX," Grade 2, commencing at £875 14s. per annum, including London allowance. Applications, giving details of education, present position, experience, etc., should be received by the Establishments Officer, British Electricity House, Lower Ham Road, Kingston on Thames, not later than June 22. (E 117)

## CROWN AGENTS FOR THE COLONIES

POWER STATION OPERATING ENGINEER required for the Electrical Services Department, Nyasaland, for one tour of 2 to 3 years in the first instance with prospect of permanency. Salary, etc., in scale £776, rising to £1,155 a year. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates, age 23 to 33, must have technical knowledge at least up to National Certificate standard, and have had shift experience in a modern steam power station operating at 400 lb. per sq. in., 750° F.

Apply in writing to the Crown Agents, 4 Millbank, London S.W.1, stating age, name in block letters, full qualifications and experience and quoting M2C/29131/EE. (E 80)

## BRITISH ELECTRICITY AUTHORITY

*Merseyside and North Wales Division*

APPLICATIONS are invited for the appointment of STATION SUPERINTENDENT at St. Helens Power Station. Salary, £1,022/£1,085 per annum, Class "E," Grade 1, N.J.B. Schedule "A." Superannuable and subject to medical examination.

Applicants should preferably possess a University degree or its equivalent, and be a Corporate Member of one or more of the recognised engineering institutions.

Application forms are obtainable from the Divisional Secretary, Beaconsfield Road, Woolton, Liverpool. Closing date: June 26, 1953. (E 96)

## LONDON COUNTY COUNCIL

REQUIRED (a) TECHNICAL ASSISTANTS; (b) JUNIOR TECHNICAL ASSISTANTS with experience in preparing specifications for electrical installations in buildings or electrical lift work, including examination of reports from outside staff and assessing necessary work, making surveys and recommendations for improvements. For (a) H.N.C. (electrical) or equivalent; for (b) O.N.C. (electrical) or equivalent. Salaries up to (a) £675, (b) 200s. according to qualifications and experience. Send s.a.e. to Chief Engineer (53/14), London County Council, County Hall, S.E.1, for form, for return within next 14 days (504). (E 84)

## WEST SUFFOLK EDUCATION COMMITTEE

Bury St. Edmunds Technical Institute

WANTED, from September, 1953, FULL-TIME TEACHER for City and Guilds Electrical Installation Course B Work, and some Electrical Engineering Subjects to Ordinary National Certificate level. Suitable Industrial experience and/or Teacher Training desirable. Salary in accordance with Burnham Technical Scale for Assistants, Grade A. Applications on Form H.6, obtainable from the undersigned (stamped foolscap envelope), to be returned as soon as possible.

R. F. A. CARTER, M.A.,
Chief Education Officer.
Manor House,
Bury St. Edmunds. (E 82)

## BRITISH ELECTRICITY AUTHORITY

*South Western Division*

ASSISTANT SHIFT CHARGE ENGINEER required at Hayle Generating Station.

Superannuation scheme. Salary N.J.B. Class "F," Grade 9, £607 to £629.

Applicants should have good technical qualifications, and a sound knowledge of the operation and maintenance of generating plant.

Applications on Form A.E.6/ACT, obtainable from Divisional Secretary, 26 Oakfield Road, Bristol, 8, should be completed and returned by June 20, 1953. (E 115)

## GOVERNMENT OF KUWAIT

ELECTRICAL MAINTENANCE ENGINEER required for service with the Government of Kuwait, Persian Gulf. Applicants, preferably not more than 35 years of age, should have some technical qualifications and good electrical engineering training and subsequent experience with switchgear and the various protective relays, transformers, cabling and electrical machinery. Steam and power plant, and diesel plant operating experience would be an advantage. The starting consolidated salary offered is at the rate of £1,500 to £1,600 per annum according to qualifications and experience. Free furnished quarters and free medical attention are provided or an allowance in lieu thereof. The first year will be probationary, and if satisfactory, home leave will be granted at the end of three years' complete service. Married accommodation cannot be promised within one year. Applications, stating age and giving full details of qualifications and experience should, in the first instance, be addressed to the Secretary, Ewbank and Partners, Ltd., 10-11 Grosvenor Place, London S.W.1. (E 122)

## CROWN AGENTS FOR THE COLONIES

ELECTRICAL FOREMAN (M2C/30017/EE) required by the Somaliland Government Public Works Department, for one tour of 12 to 15 months in the first instance. Salary, etc., according to age and experience in scale £688 rising to £793 a year. No income tax at present. Free passages. Outfit allowance £30. Liberal leave on full salary. Candidates must have served an apprenticeship to electrical engineering and have had good experience in their trade, covering work on h.v. and l.v. transmission and distribution, house wiring, wiring for motors and other equipment and the repair and overhaul of alternators, motors, etc.

SCIENTIFIC ASSISTANT (M3B/33763/EE) required for service in Antarctic with the Falkland Islands Dependencies Survey for tour of 18 or 30 months in first instance. Salary according to age and qualifications in scale £400 rising to £540 a year. Free quarters, food, clothing and canteen stores provided, enabling officer to save most of his salary. Free passages. Liberal leave on full salary. Candidates must be of good education with good knowledge of physics and radio maintenance. Selected candidate will undergo three months' course in ionospheric work before sailing.

Apply in writing to the Crown Agents, 4 Millbank, London, S.W.1, stating age, name in block letters, full qualifications and experience and quoting reference number of post applied for. (E 107)

## YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointment:—

*No. 5 (Wakefield) Sub-Area*

Castleford District.

INSTALLATION ENGINEER

The person appointed will be responsible for the organisation and administration of the Installation Section, including the supervision of manual workers. He must be capable of preparing specifications and estimates and supervising schemes for complete installations of all types and must have a thorough knowledge of the electricity supply regulations and the I.E.E. regulations for the electrical equipment of buildings.

Preference will be given to Corporate Members of the Institution of Electrical Engineers.

Salary: N.J.B., Class "E" Grade 8, £619-£629 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, not later than June 25, 1953. (E 123)

AIR MINISTRY require MECHANICAL and ELECTRICAL ENGINEERS in Works Department for design, operation and maintenance of ground mechanical and electrical works services on R.A.F. stations at home and overseas and Civil Aviation stations. Appointments in two grades: (a) Main Grade, starting salary £970, rising by eight annual increments to £1,280 per annum; (b) Assistant Grade, starting salary, age point, viz., age 25, £628 per annum, rising to £875 at age 34, thereafter rising annually to £970 per annum. Salaries somewhat lower in provinces. Appointments temporary but with long-term possibilities. Special allowance up to £1,300 a year according to location payable in addition to salary during overseas service. Candidates must be natural born British subjects. Minimum qualifications and experience for both grades of posts: (i) (a) university degree or equivalent diploma in electrical and/or mechanical engineering and at least a two-year apprenticeship or (b) graduate or corporate membership of the Institutions of Mechanical or Electrical Engineers with appreciable electrical engineering experience and at least a three-year apprenticeship and (ii) employment in responsible position for minimum of three years with well-established engineering concern providing wide experience in electrical and mechanical engineering practice.

Application forms quoting reference D290/52/A from M.L. and N.S., Technical and Scientific Register (K), Almack House, 26 King Street, London S.W.1. (E 85)

ARMATURE WINDERS AND IMPROVERS wanted for first-class electrical repairs.—Apply: Box No. 2693, Electrical Times. (E 100)

ASSISTANT FOREMAN required to supervise maintenance work on plant engaged in manufacture of photographic material. Good general engineering background with supervisory experience is essential, together with a specialised knowledge of electrical control circuit a.c. and d.c. machinery and associated starting equipment. Only men prepared to work under fairly arduous conditions and to a consistently high standard should apply. The position would be permanent and progressive to the right man. The Company operate a non-contributory pension, insurance and sickness benefit plan.—Write with full particulars to Personnel Department, Kodak Ltd., Wealdstone, Middx. (E 119)

DESIGNER DRAUGHTSMAN required by Midland Electric Manufacturing Co. Ltd., Reddings Lane, Tyseley, Birmingham. Candidates should have previous experience and be capable of developing electrical switch, fuse and motor control gear and accessories. Technical training to H.N.C. standard is desirable though not essential.—Applications, which will be dealt with in strict confidence, should include details of age, technical qualifications, previous posts and experience and be addressed to the Personnel Manager. (E 97)

DRAUGHTSMEN. The English Electric Co., Ltd., at Liverpool, have vacancies for ELECTRICAL DRAUGHTSMEN with good experience of switchgear wiring diagram work. Pensionable and progressive positions with excellent opportunities for promotion are offered to men with initiative.—Write, quoting ref. 140D, to Central Personnel Services, English Electric Co., Ltd., 336-7 Strand, London W.C.2. (E 106)

ELECTRICAL ENGINEER, to be responsible for electrical and mechanical design of overhead line insulators. Training will be given as necessary. The post is superannuable and offers opportunities for promotion. Degree in electrical engineering is an essential qualification and a recognised apprenticeship with a large industrial manufacturer desirable. Age, 23-30. Salary according to age, experience and qualifications.—Replies to the Chief Personnel Officer, Pilkington Brothers Ltd., St. Helens, Lancashire. (E 125)

ELECTRICAL FITTERS wanted for first-class electrical repairs. Opportunity for capable men. Apply: Box No. 2695, Electrical Times. (E 101)

EWBANK AND PARTNERS LTD. have vacancies for MECHANICAL ENGINEERING DRAUGHTSMEN experienced in power station design and layout, pipework layout, circulating water system and with some knowledge of coal and ash handling plants. The positions are permanent and are pensionable. Free lunches are provided and a five-day week is in operation.—Applicants should write in the first instance, stating age, details of experience and salary required to the Secretary, Ewbank and Partners, Ltd., Engineering Consultants, 10/11 Grosvenor Place, London S.W.1. (E 71)

HOUSECRAFT ADVISER AND COOKER DEMONSTRATOR with first-class experience and training is required at the Manchester Branch of the G.E.C.—Applications, in writing, should give full details of age and record and be sent to the Staff Manager, The General Electric Co., Ltd., Magnet House, Kingsway, London W.C.2, quoting ref. MB/1. (E 109)

JUNIOR ENGINEER as Internal Technical Sales Assistant, age 23/30 years. Qualifications: Higher National Certificate, though Ordinary National Certificate or lower age in exceptional circumstances will be considered. The work is concerned with the preparation of estimates and handling contracts for high voltage insulators.—Applications should be addressed to the Chief Personnel Officer, Pilkington Brothers, Ltd., St. Helens, Lancashire. (E 99)

LABORATORY ASSISTANTS for the development of instruments, meters and relays. University degree or Higher National Certificate standard required.—Apply in writing, stating age, experience and salary required, etc., marking envelopes "Meter Engineer," to Personnel Manager, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17. (E 20)

LABORATORY TECHNICIAN, with H.N.C. (electrical), required for developing and testing switch, fuse, motor control gear and accessories. This is a permanent and progressive post. Applications which will be dealt with in strict confidence, should include details of age, technical qualifications, previous posts and experience and be addressed to the Personnel Manager, Midland Electric Manufacturing Co. Ltd., Reddings Lane, Tyseley, Birmingham. (E 98)

**BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2**

*Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.*

MINISTRY OF SUPPLY, R.A.E., Farnborough, Hants, requires ELECTRICAL or MECHANICAL ENGINEER as SCIENTIFIC OFFICER for research and development in connection with generation, conversion and control of electric power for aircraft. Work includes planning of general layout of aircraft supply system, design and development of rotating machinery and associated control equipment to meet special conditions of operation encountered in modern aircraft and guided missiles, and allows considerable scope for originality in devising associated equipment. Qualifications: 1st or 2nd class hons. degree or equiv. in engineering or in physics or mathematics with subsequent elec. eng. experience. Experience of original work in design of dynamo electrical machinery may be advantage. Salary within range, £417 to £675. Women somewhat less. Post unestablished. F.S.S.U. benefits may be available.—Application forms from M.L.N.S., Technical and Scientific Register (K), 26 King Street, London S.W.1, quoting D 54/53A. Closing date, July 10, 1953. (E 127)

RESEARCH Engineering Company at Feltham has a vacancy for an ELECTRICIAN, able to carry out installations on a small scale and routine maintenance. Some knowledge of electronics advantageous.—Reply to Box No. 2697, Electrical Times. (E 102)

STATION ENGINEERS (several) required by Air Ministry for installation, operation and maintenance of high and medium voltage electrical distribution systems, electrical installations, steam and hot water heating systems and miscellaneous plant, tools and equipment on R.A.F. stations and civil aviation stations in U.K. Appointments include liability for service overseas, minimum qualifications and experience: (a) Ordinary National Certificate in electrical engineering or equivalent standard of technical education; (b) recognised apprenticeship in electrical engineering; (c) employed for at least three years in electrical engineering preferably on operation and maintenance of mine, factory or workshop plant and services, any experience on maintenance and operation of diesel generating plant and staff supervision advantageous. Commencing salary according to age (normally £550 at 23 or over), qualification and experience in range £508 to £628, London. Provincial rates somewhat lower. Special allowance payable in addition during overseas service. Appointments non-pensionable. Only natural born British subjects.—Write, giving age, full details of qualifications and experience to London Appointments Office, 1-6 Tavistock Square, W.C.1, Ref. E.A.595, by June 26, 1953. Only candidates selected for interview will be notified. In no circumstances should original testimonials be forwarded. (E 86)

STOCK CHECKER. Applications are invited by the North of Scotland Hydro-Electric Board for the post of Assistant in the Chief Accountant's Department in charge of stock checking. Applicants must have a sound knowledge of electrical stores and equipment and of stock-taking procedure and must be prepared to travel extensively in the Board's area. Initial placing on Grade 4 of the National Joint Council Scale, £580 by £20 to £640, will be determined by experience and qualifications. Superannuation scheme is available.—Application form obtainable from the Secretary, 16 Rothesay Terrace, Edinburgh 3, should be returned by Friday, June 19, 1953. (E 128)

THE ASSOCIATED ETHYL CO., LTD., Northwich, Cheshire, a company operating a number of chemical plants, have the following vacancies in the drawing office of their Engineering Department:—

(a) ELECTRICAL SECTION LEADER.
(b) ELECTRICAL DESIGN DRAUGHTSMAN.

Candidates should be experienced in the design and layout of electrical distribution and utilisation work as practised in either chemical or petroleum processes. Applicants for position (a) should be between 28 and 32 years of age, have served an engineering apprenticeship and have obtained a Higher National Certificate in Electrical Engineering or recognised equivalent. Applicants for position (b) should be between 25 and 30 years of age, have served an engineering apprenticeship and preferably have obtained a Higher National Certificate or currently studying for same. The successful applicants will be based ultimately at the company's works now nearing completion at Ellesmere Port, but initially the duties will be carried out from Northwich. —Applications stating age, qualifications, experience and salary required should be sent to the Personnel Manager at the above address. (E 110)

SWITCHGEAR DRAUGHTSMEN are required by the English Electric Co., Ltd., in their Manchester drawing office. Only men with extensive metal-clad and diagram experience will be considered for these vacancies.—Write, giving details, age, experience, etc., quoting Ref. 1128, to Department C.P.S., 336/7, Strand, W.C.2. (E 39)

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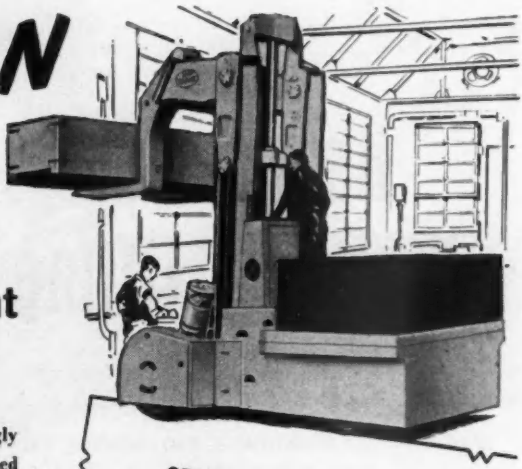

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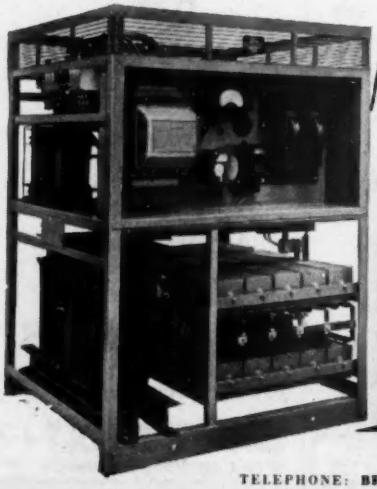

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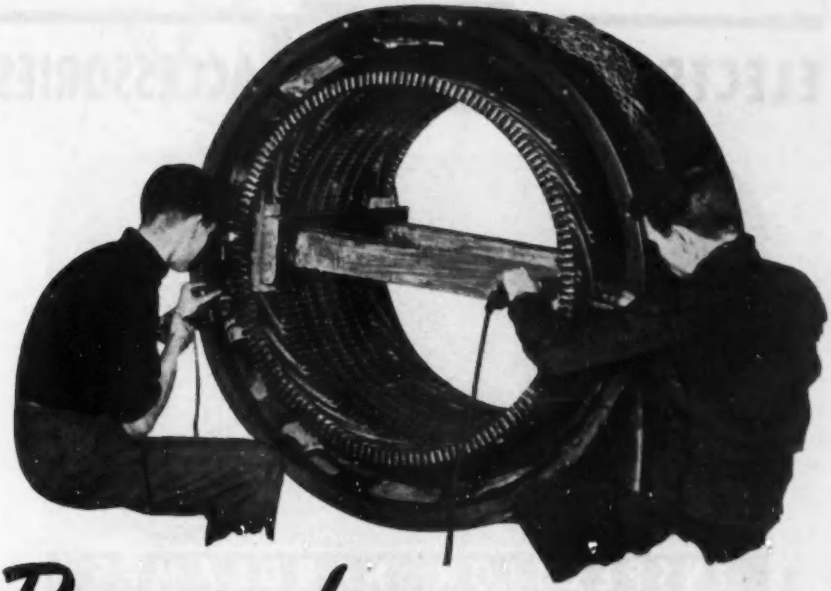

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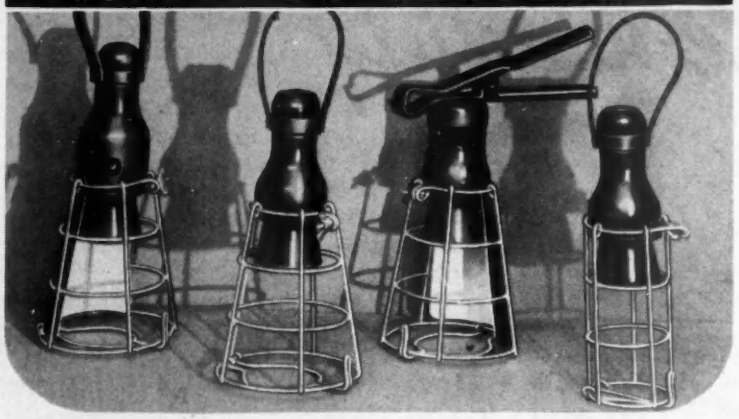

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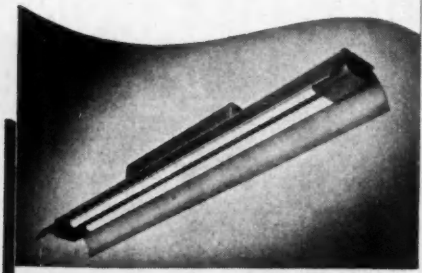
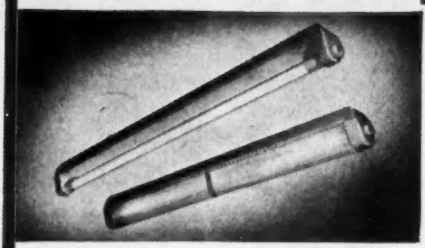


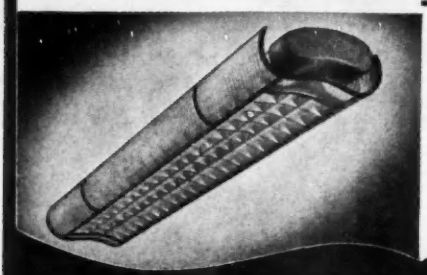
FE/2081.

This ATLAS fitting throws a better light on many industrial problems. And it's able to "stick at it" because of the "Miracoat" finish that defies corrosive atmospheres. It has two 80 watt lamps.



FB/0081.

A cheery fellow this. In its working dress, it is a simple soft 80 watt batten light, throwing out direct and reflected illumination in factories and offices. But clothe it in its diffuser and you have a unit which fits happily into many surroundings.



GN/2040.

No photograph can do justice to the GN/2040, in its decorative diffuser. The downward light from the louvres, the soft glow through the side panels, make it a fountain of light. It carries two 4 ft. 40 watt lamps.

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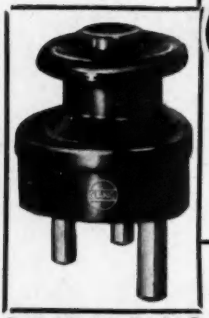

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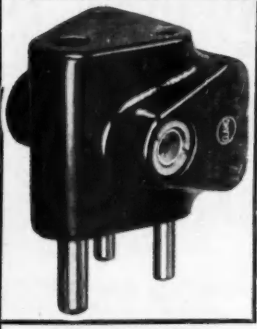

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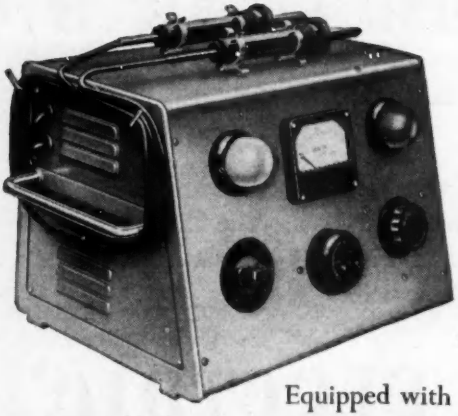

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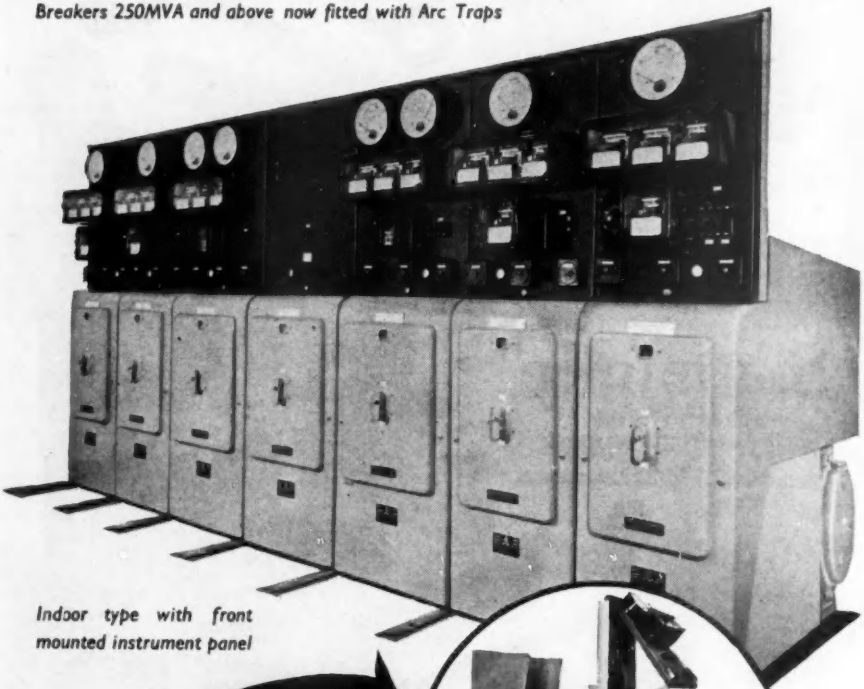
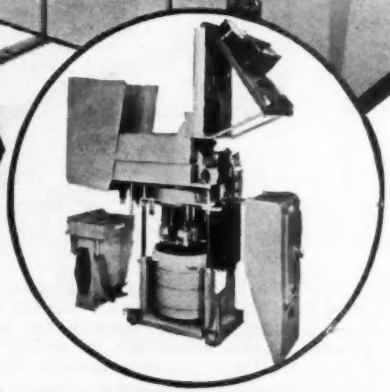


*Indoor type with front mounted instrument panel*



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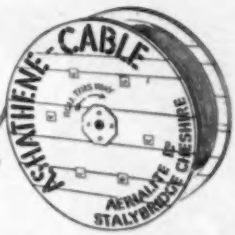


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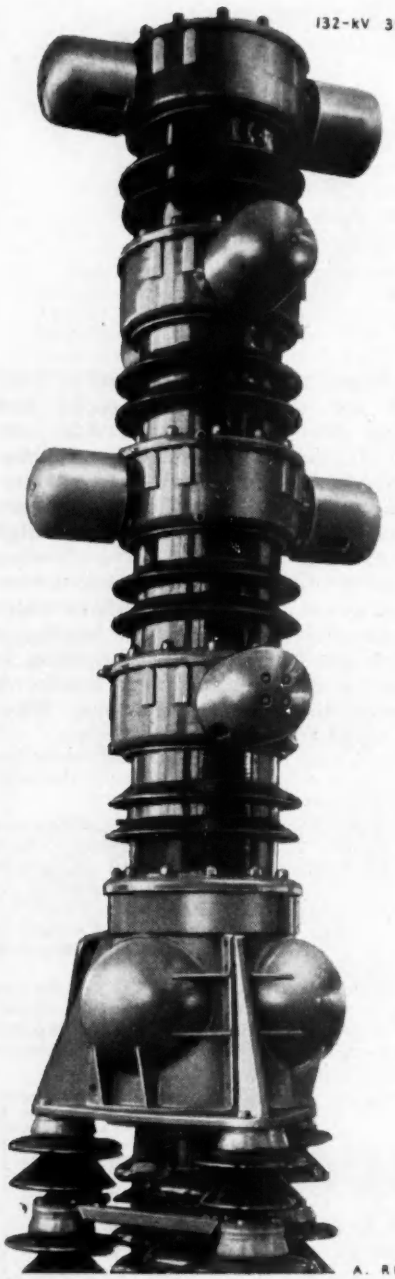

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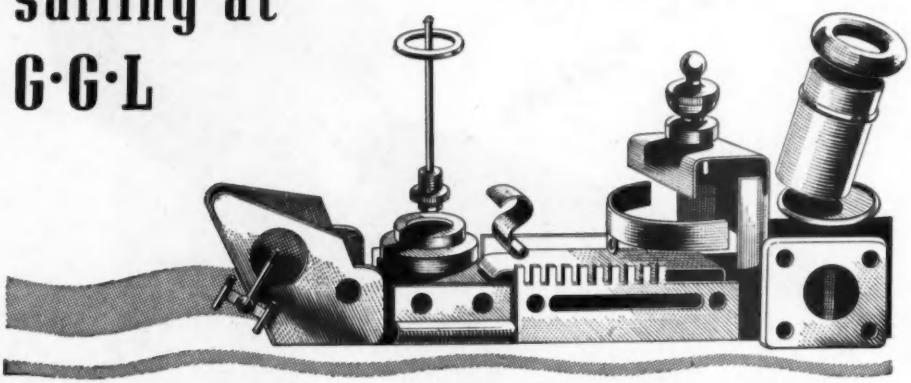

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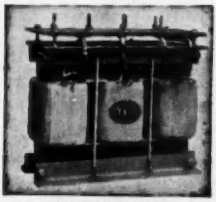

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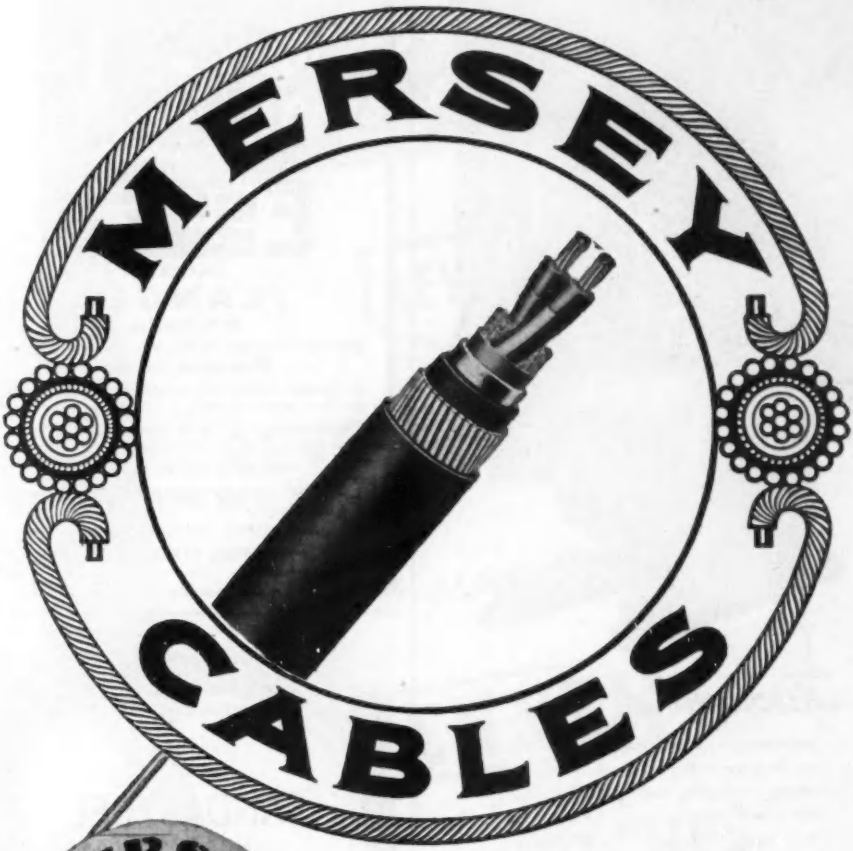


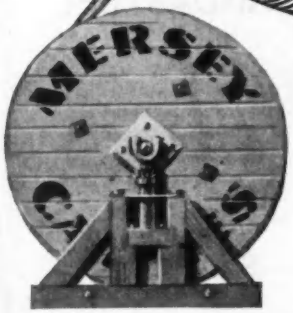


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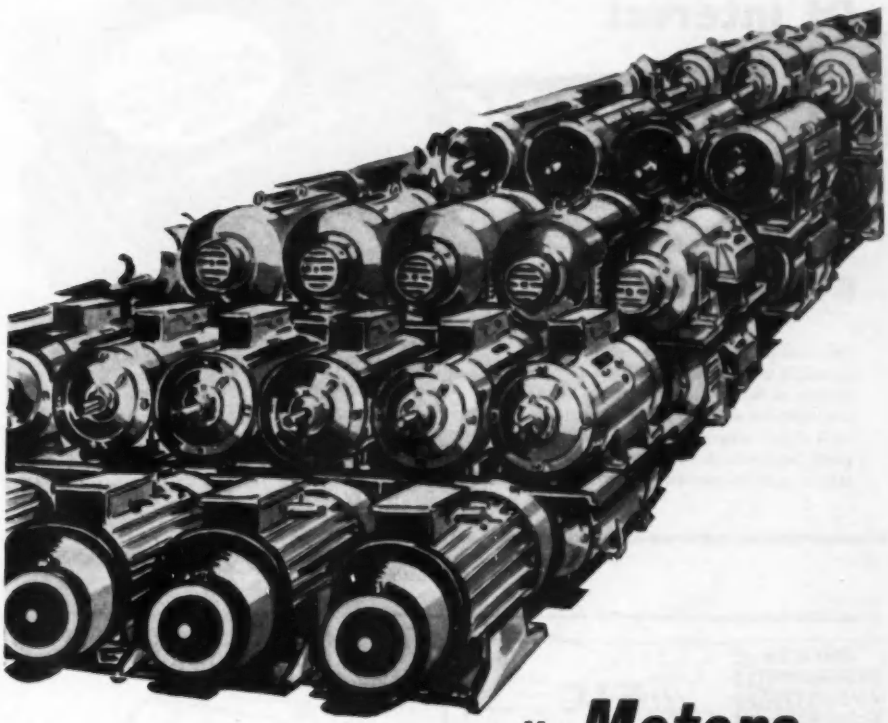

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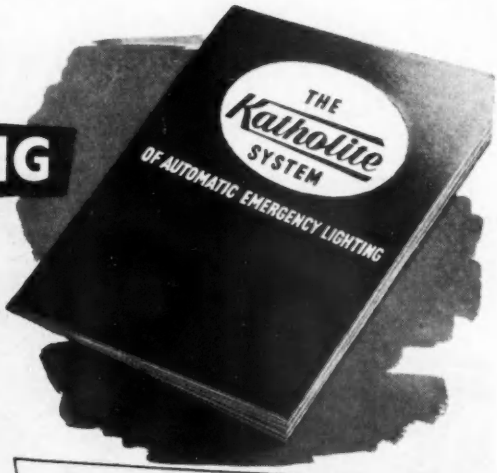


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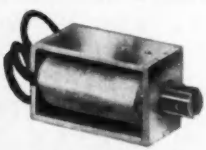

*Now made in England*

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## Ho! Ho! says Oi to Squire

Look at this 'ere electric socket. Plug 'oles be all stopped up. London chaps baint so smart this time. Silas—says Squire—Don't ee know they done it a-purpose to stop silly old fingers like yourn from a-proddin' and a-pryin'. If you push plug in bit harder you'll find it goes in all right; a bit sharpish, too. Just like you, Silas, nipping into Dog and Duckling five minutes after closing time. I've seen you.

*Anti-flash shutters, pioneered by MK, have four vital functions. They quench the arc, keep out dust, prevent interference and produce 'Snap-action' a feature exclusive to MK. When the resistance of the trigger to the earth pin is overcome, the plug is compelled to enter decisively and safely.*



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(Registered)

11 ins

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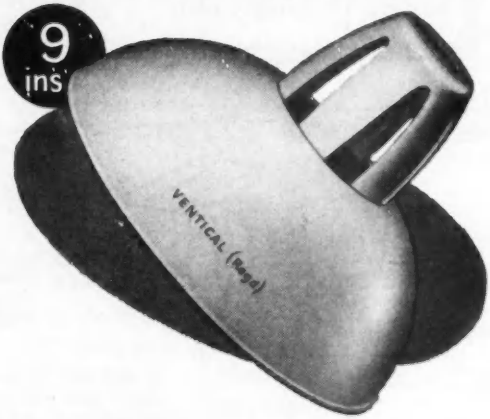

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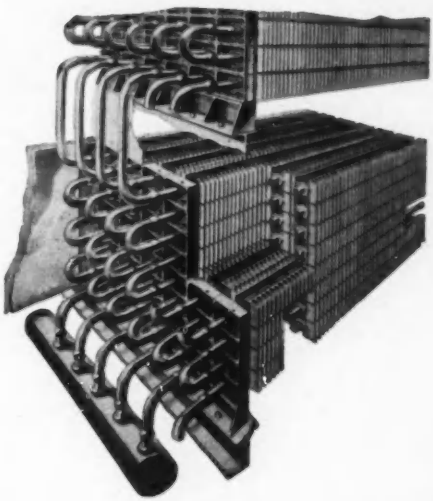
*For waste heat recovery at highest pressures*

# SENIOR *welded* ECONOMISER



The illustration shows the construction of the tube elements in the Senior Welded Economiser, as used in modern Generating Stations. Maximum heat transfer is effected by H-gilled sleeves which are shrunk on cold-drawn steel tubes, all tube joints being welded. The construction is suitable for all operating pressures.

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